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REVISION DESCRIPTION

REV LTR	DATE	DESCRIPTION
A	Apr. 1989	This revision adds the thermal safety factor analysis, factory joint inspections, and edge separation evaluation to the interim report. The format of the report has also been changed slightly to produce a standard format that will be used for future postfire insulation component reports.

ABSTRACT

Volume III of this postfire report deals with the insulation component of the RSRM. The report is released twice for each flight set. The interim release contract date is on or before 45 days after the last field joint or nozzle to case joint is disassembled at KSC and contains the results of the KSC visual evaluation. The data contained in the Volume III interim release supersedes the insulation data presented in the KSC 10 day report. The final release contract date is on or before 45 days after the last factory joint is disassembled at the Clearfield H-7 facility and contains the results of all visual evaluations and a thermal safety factor analysis. The data contained in the Volume III final release supersedes the interim release and the insulation data presented in the Clearfield 10 day report.

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ACRONYM LIST

ASF	-	Actual Safety Factor
CEI	-	Contract End Item
CF/EPDM	-	Carbon Fiber Filled EPDM
CSF	-	Compliance Safety Factor
DR	-	Discrepancy Report
EMT	-	Engineering Management Team
EPDM	-	Ethylene Propylene Diene Monomer
ET	-	External Tank
E.T.	-	Exposure Time
FRR	-	Flight Readiness Review
HPM	-	High Performance Motor
I.D.	-	Inside Diameter
KSC	-	Kennedy Space Center
M + 3σ	-	Median Plus Three Times The Standard Deviation
MDD	-	Material Decomposition Depth
MDR	-	Material Decomposition Rate
MDT	-	Minimum Design Thickness
NBR	-	Acrylonitrile Butadiene Rubber
PEEL	-	Postfire Engineering Evaluation Limits
PEEP	-	Postfire Engineering Evaluation Plan
PFAR	-	Postfire Anomaly Record
PR	-	Problem Report
PSI	-	Pounds Per Square Inch
RPRB	-	Redesign Program Review Board
RSRM	-	Redesign Solid Rocket Motor
SRB	-	Solid Rocket Booster
SRM	-	Solid Rocket Motor
STS	-	Space Transportation System
TPS	-	Thermal Protection System

1.0 INTRODUCTION

STS-26 was launched from KSC pad 39B on 29 September 1988. Two RSRM's were part of the launch system and were designated RSRM-1A (360L001A) and RSRM-1B (360L001B). Both motors incorporated the redesigned case field joint and nozzle to case joint as shown on Figure 1. Following booster separation and splashdown, the motors were recovered and returned to Hangar AF at the Cape Canaveral Air Force Station adjacent to the Kennedy Space Center for disassembly and inspection. The results of this inspection were documented in the interim release of this report.

Following the inspection at Hanger AF, the segments were returned to the Morton Thiokol Refurbishment H-7 facility at Clearfield. There, the insulation thicknesses were measured and the factory joints were disassembled. The documentation of these inspections and the performance evaluation (thermal safety factor analysis) have been added to this final release of the report.

In an attempt to standardize and document the evaluation of flight RSRM's, a Postfire Engineering Evaluation Plan has been written (Reference 1). The PEEP outlines the basic evaluations to be performed. Appropriate procedures contained in this plan were used to evaluate the internal and external insulation. The intent of these procedures is to insure that all pertinent evaluation points are examined and documented in a consistent and complete manner.

2.0 OBJECTIVE

The objective of this postflight evaluation report is to document the postfire condition of the internal and external insulation and evaluate the thermal safety factors of the RSRM-1A and RSRM-1B internal insulation. An additional objective of this document is to discuss the Insulation Component Program Team assessment of the observations.

3.0 SUMMARY

A summary of the RSRM-1A and RSRM-1B external and internal insulation condition is found below. A detailed description and evaluation of the results can be found in Sections 6.0 through 9.0.

3.1 EXTERNAL INSULATION

The stiffener ring and stub insulation, factory joint weatherseal, and exterior motor case appeared to be in good condition. A small area (approximately 1 by 3 inches) of missing EPDM insulation was noted on RSRM-1A aft center factory joint weatherseal at approximately 190°. An axial streak mark on the case aft of the missing material indicated that the weatherseal was probably hit by nozzle debris at severance or splashdown. It has not been determined at what point in time this occurred. No evidence of moisture under the weatherseal on any of the factory joints was identified. During the hydrolasing process for TPS removal, a gouge was accidentally cut through the weatherseal on the RSRM-1A aft dome factory joint.

3.2 NOZZLE TO CASE JOINTS

Based on the visual evaluation, both nozzle to case joints performed exceptionally. No gas paths through the polysulfide adhesive or any other anomalous conditions were identified. The polysulfide adhesive had numerous small voids (4 on RSRM-1A and 20 on RSRM-1B) around the circumference. Maximum void size noted was 1.03 inches axial by 0.34 inch circumferential. The voids were typical of RSRM nozzle to case joints, and none of the voids noted were as large as those observed on previous motors.

3.3 FIELD JOINTS

The internal insulation in all six of the case field joints performed as designed, and no anomalous conditions were identified. J-leg tip contact was evident full circumference at each joint. Soot deposits extending down the bondline into the start of the radius were noted on both forward field joints. The initial appearance of these

areas could be construed to be chamber gas leakage into the joint bondline, but the soot was readily removable with solvent. This sooting is believed to have occurred in conjunction with the phenomena which generates the radial tears in the NBR inhibitor stubs (See Sections 6.5.3 and 8.5.3).

Clevis edge separations were evaluated postfire at the Clearfield H-7 facility and compared to those taken prefire at KSC (which were repaired). Most separations were hard probed at KSC and H-7 prior to measurement. The maximum clevis edge separation documented postfire was 0.36 inch, on the RSRM-1B aft center segment. There was no prefire separation at this location, so it also resulted in the maximum clevis axial growth of 0.36 inch. Failure modes indicated that the predominant failure was at the Chemlok 205 to case interface.

Tang edge separations were also documented, although in some cases full prefire depth was not obtainable. Prior to stacking, it is possible to measure tang separations only to the depth of the steel chamfer (0.175-0.192 inch). Therefore, true axial growth cannot be evaluated on separations deeper than 0.175 inch prefire but maximum growth can be determined. The largest tang separation found postfire was 0.35 inch on the RSRM-1B forward segment. There was no prefire separation at this location, so it also resulted in the maximum tang axial growth of 0.35 inch.

Insulation Design feels that none of these separations, clevis or tang, were significant. The grit blast surface on these segments in the separation region was 32 Ra. By analyzing the failure modes, it is felt that the smooth surface is the primary cause of these separations.

3.4 IGNITER TO CASE JOINTS

The igniter boss insulation was in good condition. RSRM-1A had one small edge separation (.015 inch radial depth) and RSRM-1B had minor insulation flashing at the boss.

3.5 INTERNAL ACREAGE INSULATION

The acreage insulation, including the internal insulation over each of the factory joints, appeared in good condition. No evidence of gas paths through the insulation or severe erosion was identified.

3.5.1 Center Segments

Numerous radial tears (17 on RSRM-1A and 11 on RSRM-1B) greater than 3 inches radially were noted in the forward center segment NBR inhibitor stubs. Some of the tears extended radially outward to approximately 5 inches inboard of the clevis I.D. The edges of the tears appeared rough, matched when placed together, and demonstrated no material loss or erosion. This indicated that the tears occurred after motor burn. Tears were also noted in the RSRM-1A aft center segment inhibitor stub. The radial extent and frequency of the tears identified in the inhibitor stubs are within the range of tears noted on past flight motors.

3.5.2 Forward Segments

The stress relief flap, including the castable inhibitor slot, was present full circumference with no significant erosion on either forward segment. The castable inhibitor was completely missing full circumference including the material normally present in the castable inhibitor slot. Numerous axial tears (87 on RSRM-1A and 75 on RSRM-1B) were identified in the remaining flap. The edges of the tears appeared rough, matched when placed together, and demonstrated no material loss or erosion. Axial tears must have occurred after motor burn since there was no unique erosion pattern under flap, and the torn edges matched. This condition has not been documented on any previous flight motors.

3.6 FACTORY JOINTS

The condition of all factory joints was excellent. No abnormal erosion or gas paths were noted. Remaining Teflon tape was visible in most joints as well as normal intermittent NBR flashing on the inner clevis leg tip.

3.7 INSULATION THERMAL PERFORMANCE

No unacceptable conditions were found in the thermal safety factor evaluation of the nozzle to case joints, field joints, factory joints, and case wall acreage areas. A summary of minimum safety factors can be found in Tables 1 through 3.

A total of eight stations in RSRM-1A and two stations in RSRM-1B had apparently violated the thermal safety factor requirements. An analysis of the insulation surface conditions, surrounding prefire and postfire data, and visual inspections indicated that the prefire measurements were inaccurate. Insulation Design has determined that the apparent safety factor violations are due to erroneous data and are not actual violations (see Sections 7.0 and 9.0).

4.0 CONCLUSIONS

During the KSC evaluation, Squawk forms were generated to report and track unexpected observations and observations which violated the Postfire Engineering Evaluation Limits (Reference 2). The Squawks were reviewed by the SRB/SRM Postflight Assessment Team, and some of the Squawks were elevated to PR's. The PR's and Squawks are contained in Reference 3. All observations, both at KSC and at the Clearfield H-7, were documented on observation forms.

All observations presented in this document were reviewed by the Insulation Component Program Team to determine which observations were also potential anomalies. The Insulation Component Program Team classified each of the potential anomalies as 'critical', 'major', or 'minor' anomaly or 'remains observation' as defined per the Table 4 RPRB criteria. The observations documented on PR's and Squawks were automatically termed potential anomalies.

4.1 KSC EVALUATION CLASSIFICATIONS

The Insulation Component Program Team identified five conditions observed at KSC (11 total observations) which were considered potential anomalies:

1. Clevis edge separation axial growth was identified on five of the six segments. The following PR's were written against the individual segments:
   PR 360L001A-25 (Squawk I.D. number 26-0068) - RSRM-1A aft center segment
   PR 360L001A-15 (Squawk I.D. number 26-0066) - RSRM-1A forward center segment
   PR 360L001B-26 (Squawk I.D. number 26-0072) - RSRM-1B aft segment
   PR 360L001B-17 (Squawk I.D. number 26-0067) - RSRM-1B aft center segment
   PR 360L001B-16 (Squawk I.D. number 26-0065) - RSRM-1B forward center segment
   The potential anomaly was not classified pending further investigation of the edge separations at the H-7 Clearfield facility. This classification is found in Section 4.2.

'Remains Observation'

2. Gouges or cuts in the acreage insulation were identified on three segments. The following Squawks were written against the individual segments:
   Squawk I.D. number 26-0091 - RSRM-1A aft center segment
   Squawk I.D. number 26-0093 - RSRM-1B forward center segment
   Squawk I.D. number 26-0092 - RSRM-1B forward segment
   The gouges and cuts on the internal acreage insulation were classified as 'remains observation' because they occurred after motor burn either during nozzle severance or splashdown.

3. A gouge was identified in the RSRM-1A aft center segment factory joint weatherseal. Since the gouge on the weatherseal did not affect motor performance, it was classified as 'remains observation'.

4. Axial stress relief flap tears were noted in both forward segments. The frequency of axial stress relief flap tears were unexpected observations, however, they appeared to have occurred after motor burn, and were classified as 'remains observation'.

5. Soot deposits were noted extending down the bondline into the start of the radius at several circumferential locations within both forward field joints. The soot deposits were unexpected observations, however, they appeared to have occurred after motor burn, and were classified as 'remains observation'.

The Insulation Component Program Team presented their assessment of the KSC observations shown to the EMT on 7 November 1988 and to the RPRB on 9 November 1988. The EMT and the RPRB accepted the insulation team's classifications as presented.

Postfire Anomaly Record's (PFARs) were not required due to the 'remains observation' classification of the potential anomalies.

4.2 H-7 EVALUATION CLASSIFICATIONS

The Insulation Component Program Team identified two conditions observed at Clearfield H-7 which were considered potential anomalies: 'Remains Observation':

1. Eight stations within RSRM-1A and two stations within RSRM-1B had apparently violated the minimum thermal safety factor requirement. Since Insulation Design believes that these are due to erroneous data, the observation was classified as 'remains observation'.

2. A number of clevis and tang edge separations were documented. The maximum depth for clevis separations was 0.360 inch and for tang separations was 0.350 inch. Insulation Design feels that none of the separations noted were significant, hence, the observation was classified as 'remains observation'.

The Insulation Component Program Team presented their assessment of the Clearfield H-7 observations shown to the RPRB on 1 March 1989. The RPRB accepted the insulation team's classifications as presented.

PFARs were not required due to the 'remains observation' classification of the potential anomalies.

5.0 RECOMMENDATIONS

The following recommendations are based on the results of the RSRM-1 postfire inspection.

5.1 KSC EVALUATION RECOMMENDATIONS

1. The forward segment stress relief flaps on subsequent flight motors should be evaluated for tears similar to the tears demonstrated on these motors.

2. The field joints on subsequent flight motors should be evaluated for soot deposits extending down the bondline into the start of the radius region.

3. The KSC PEEP should be updated to incorporate lessons learned during the evaluation process of RSRM-1.

4. The KSC PEEL should be updated to include changes as identified during the postfire evaluation of RSRM-1. The current limits contained in the PEEL for edge separations states that growth from the prefire unrepaired condition is 'reportable'. This limit should be changed to allow a minimum amount of growth based on prefire acceptable structural and thermal analysis. The performance of RSRM static test motors and RSRM-1 should also be taken into consideration when establishing this new limit. The expected condition statement for the acreage insulation contained in the PEEL should be updated to include gouges and cuts caused by nozzle severance or water impact debris as nominal conditions. Gouges and cuts similar to the ones found on these two motors have been noted on other flight motors.

5.2 H-7 EVALUATION RECOMMENDATIONS

1. Prefire insulation thickness measurements of subsequent motors need to be screened and all outlying data remeasured and verified or corrected to ensure that safety factor violations do not occur due to bad prefire data.

2. Eliminate or move performance stations that have provided unreliable prefire insulation thickness data in the past in accordance with Reference 4.

3. Noting that edge separation failure was primarily a result of a smooth surface finish, it is recommended that the gritblast region be extended to include the entire NBR bonding region.

6.0 RSRM-1A VISUAL EVALUATIONS

The following paragraphs discuss the RSRM-1A evaluations. During the postfire evaluation, Insulation Design documented the condition of the external and internal insulation components. A copy of the documentation for RSRM-1A can be found in Appendix A. The condition of the insulation components for each segment is addressed in the following subsections.

6.1 RSRM-1A EXTERNAL INSULATION

6.1.1 RSRM-1A External Factory Joint Weatherseals

The factory joint weatherseal of each joint was visually inspected. No weeping, wet areas at the edges of the weatherseal, or any other

evidence of moisture within any joint was identified. During the hydrolasing process for TPS removal, a gouge was accidentally cut through the weatherseal in the aft dome factory joint.

6.1.2 RSRM-1A Stiffener Rings and Stiffener Stubs

The stiffener ring flange EPDM insulation suffered minor gouges from splashdown debris and hydrolasing. The overall flange insulation was present and well bonded. Thermal degradation was observed on the outer flange surface insulation from 220° through 270° to 330° on all rings.

The insulation on the stiffener ring webs had minor tears and moderate separations over a localized region of approximately 60° centered at 150°.

The EPDM insulation on the stiffener stubs was in good shape overall. No missing material, separations, or tears were observed.

It is important to note that because of a scheduling conflict, a more thorough evaluation of the stiffener ring insulation was not done.

6.2 RSRM-1A NOZZLE TO CASE JOINT

The nozzle to case joint performed as expected with no polysulfide blowholes identified across the bondline. Four voids in the polysulfide adhesive were noted at and aft of the step region. These voids were caused by entrapped air in the adhesive during assembly. None of the voids extended across the entire bondline or were exposed to hot gas. The largest void was identified at 189° and measured 0.38 inch axial by 0.25 inch circumferential. The size and location of the noted voids are contained in Table A-1.

The failure mode of the polysulfide was approximately 40% cohesive within the polysulfide and 60% adhesive at the NBR to polysulfide interface. A small amount of porosity was noted within the polysulfide bondline at the step region. The vent slots showed an average polysulfide fill of 80% with values ranging from 20% to 100% fill.

The bondline around the circumference demonstrated erosion similar to that observed on RSRM static test motors. The polysulfide bondline was decomposed further into the joint (approximately 6.09 inches from the

aft face of the nozzle boss) than the flap erosion. For approximately 0.34 inch further aft (5.75 inches from the aft face of the nozzle boss), the polysulfide was partially decomposed and bubbled. Although the material was partially decomposed, no gas flow had occurred in the adhesive bondline decomposed region.

The insulation erosion in the joint region was similar to the condition of previous RSRM motors. The char layer on the CF/EPDM had swollen to the point that the postfire material thickness near the joint appeared to exceed the prefire material thickness.

The baffle appeared to be in excellent shape. This baffle had been torn and repaired during nozzle changeout operations. The repaired areas appeared to be unaffected. The NBR flap had been heat affected, and several small areas of the inboard 0.5 inch of flap had been torn away from the aft dome and remained with the fixed housing intermittently around the circumference. This is believed to be due to heat soak during motor descent.

6.3 RSRM-1A FIELD JOINTS

6.3.1 RSRM-1A Aft Field Joint

The aft field joint insulation configuration performed as designed. The tang and clevis joint insulation were in excellent condition. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table A-2.

The general appearance of the pressure sensitive adhesive was noted. Contact within the joint was based on the matted appearance and flat texture of the adhesive, and non-contact was based on the glossy appearance of the adhesive. The joint appeared to have made contact full circumference at the tip of the J-leg. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg to an average of 2.00 inches outboard of the material remaining (Figure 2). A minimum radial contact of 0.52 inches was measured at 340°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-ring was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot, charred insulation, and a small amount of particulate slag.

Prior to stacking, the tang and clevis insulation to case bondline of each segment was inspected. Edge separations were identified on both the clevis and tang of this joint during this inspection. The tang insulation edge separations identified were not repaired while the clevis insulation edge separations were repaired. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. The deepest edge separation, 0.22 inch axial depth, was identified from 256° to 258°. This measured 0.35 inch prefire and was repaired. During prefire inspection, the maximum clevis edge separation identified and repaired was 0.50 inch at 291°. There was no postfire separation at this location. These are documented in Table 5. Tang separations are documented on Table 6. The maximum prefire condition as 0.17 inch at 38° - 41°, which was not detected postfire. The maximum postfire condition was 0.15 inch at 46°. There was no prefire separation at this location. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

6.3.2 RSRM-1A Center Field Joint

The center field joint insulation configuration performed as designed. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table A-3.

The general appearance of the pressure sensitive adhesive was noted. Contact and non-contact within the joint was based on the matted appearance and flat texture or the glossy appearance of the adhesive.

The joint appeared to have made contact full circumference at the tip of the J-leg. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg to an average of 1.80 inches outboard of the material remaining (Figure 3). A minimum radial contact of 1.10 inches was measured at 252°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-rings was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot and charred insulation.

Edge separations were identified on the clevis of this joint during the prefire inspection. No edge separations were found on the tang end. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. The deepest edge separation, 0.26 inch axial depth, were identified at 44° and 207°. During the prefire inspection, the maximum separation depth noted was 0.25 inch at 304°. These are noted on Table 5 as well as any axial growth. Tang separations are documented on Table 6. The maximum tang postfire separation was 0.15 inch at 306°, which was not present prefire. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

6.3.3 RSRM-1A Forward Field Joint

The forward field joint insulation configuration performed as designed. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table A-4.

The general appearance of the pressure sensitive adhesive was noted. The joint appeared to have made contact full circumference at the tip of the J-leg. The adhesive appeared matted with a flat texture. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg to an average of 1.28 inches outboard of the material remaining (Figure 4). A minimum radial contact of 0.70 inch was measured at 310°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-ring was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

Soot deposits extending down the bondline into the start of the radius were identified at several locations around the circumference (Figure 5). These sooted regions frequently corresponded to large radial inhibitor stub tears or areas where a portion of the NBR inhibitor stub was torn away. The initial appearance could be construed to be chamber gas leakage into the joint bondline, but the soot was readily removable with solvent. The pressure sensitive adhesive in these regions was still tacky to the touch and showed no signs of heat effect. This sooting is believed to have occurred in conjunction with the phenomena which generates the radial tears in the NBR inhibitor stubs (see Section 6.5.3).

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot and charred insulation.

Edge separations were identified on both the clevis and tang of this joint during the prefire inspection. Maximum clevis separation depth was 0.16 inch at 149° - 157°. Maximum tang separations were greater than 0.175 inch (depth of chamfer). The tang insulation edge separations identified were not repaired while the clevis insulation edge separations were repaired. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. The deepest clevis

separation, 0.24 inch axial depth, was identified at 70° and is documented on Table 5. The largest tang separation measured postfire was 0.30 inch and is shown on Table 6. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

6.4 RSRM-1A IGNITER TO CASE JOINT

The condition of the igniter boss insulation was excellent. An evaluation of the insulation to case interface revealed one edge separation of 0.015 inch radial depth located at 246°. The molded insulation surface was in good condition with normal erosion on the inboard surface. The condition of the igniter internal and external insulation is discussed in a separate document (Reference 6).

6.5 RSRM-1A SEGMENT INTERNAL INSULATION

6.5.1 RSRM-1A Aft Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Measurements of the remaining inhibitor stub heights were taken inboard from the I.D. surface of the inner clevis leg every 30° and are contained in Table A-5. The remaining inhibitor stub heights for this motor were within the expected tolerance band for all past flight motors based on a statistical analysis of the historical database (Reference 7).

There was no liner remaining in the aft segment. This condition is common for an aft segment.

The erosion in the aft dome was similar to past flight motors. The NBR under the CF/EPDM was not exposed, and the insulation in the aft dome did not appear to be eroded as severely as previous RSRM static motors. This variation between flight and static motors has been common throughout the history of the SRM program.

No evidence of blisters, discolorations, repairs, separations, delaminations, or excessive erosion was identified.

6.5.2 RSRM-1A Aft Center Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Four radial tears greater than 3 inches long were noted. The fact that the edges of the tears appeared rough and matched when placed together demonstrated no material loss or erosion had occurred. This indicates that the tears occurred after motor burn. The location and length of the tears are contained in Table A-6 and Figure 6. The tears are believed to be a result of re-entry or splashdown loads.

Measurements from the I.D. surface of the inner clevis leg to the tip of the remaining NBR inhibitor stub were taken every 30° and are contained in Table A-6. The remaining inhibitor stub heights for this motor were within the expected tolerance band.

Liner coverage in the aft center segment was heavy near the clevis end and completely missing aft of the factory joint. Small patches of thin liner were present on the insulation over the factory joint. Due to the poor lighting condition and the coating of wet char inside of the motor segments, the exact pattern and termination points of the liner material could not readily be determined at KSC. The diagram of the liner pattern was obtained after the segments arrived at the Clearfield H-7 facility and the char was rinsed from the insulation surface, and is shown in Figure 7.

The castable inhibitor was completely missing full circumference, which is typical of an aft center segment.

The stress relief flap was eroded back to the flap bulb full circumference, which is typical. The CF/EPDM under the flap was eroded for approximately 85% of the circumference and remained intact from approximately 110° through 160°. The portion of the CF/EPDM remaining appeared to be heat affected.

A small gouge or cut caused by splashdown debris was identified in the insulation surface 42 inches forward of the tip of the tang at 20°. Based on the jagged non-eroded edges of the cut, the damage appears to have occurred after motor burn.

6.5.3 RSRM-1A Forward Center Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Seventeen radial tears greater than 3 inches long were noted. Eleven of the seventeen tears extended radially outward to approximately 5 inches inboard of the clevis I.D. surface. The fact that edges of the tears appeared rough and matched when placed together demonstrated no material loss or erosion occurred. This indicates that the tears occurred after motor burn. The location and length of the tears are contained in Table A-7 and Figure 8. In addition to the radial tears, a piece of material was missing from 340° through 0° to 12°. The tears and missing material are believed to be a result of re-entry or splashdown loads.

Measurements from the I.D. surface of the inner clevis leg to the tip of the remaining NBR inhibitor stub were taken every 30° and are contained in Table A-7. The remaining inhibitor heights for this motor were within the expected tolerance band.

Liner coverage for the forward center segment was heavy near the clevis end and completely missing aft of the factory joint. Small patches of thin liner were present on the insulation over the factory joint. Due to the poor lighting condition and the coating of wet char inside of the motor segments, the exact pattern and termination points of the liner material could not readily be determined at KSC. The diagram of the liner pattern was obtained after the segments arrived at the Clearfield H-7 facility and the char was rinsed from the insulation surface, and is shown in Figure 9.

The castable inhibitor was completely missing full circumference which is typical of a forward center segment.

The stress relief flap length was missing for approximately 11 inches from the tip of the tang full circumference. Axial measurements from the tip of the tang to the aft edge of the remaining flap were taken every 90° and are shown in Table A-7. The CF/EPDM under the flap was heat affected and present full circumference.

6.5.4 RSRM-1A Forward Segment Acreage Insulation

The eleven point star pattern in the liner was easily distinguishable, and the star and non-star liner termination points were comparable to past flight motors (Figure 10). The liner remaining at the star tip regions was present from the tip of the tang forward to 142 inches. The liner remaining at the non-star tip regions was present from the tip of the tang forward to 148.5 inches.

The castable inhibitor was completely missing full circumference including the material normally present in the castable inhibitor slot.

The stress relief flap including the castable inhibitor slot was intact full circumference with no significant erosion. Eighty-seven axial tears were present in the remaining flap. This condition has not been documented on any previous flight motors. Measurements of these tears are contained in Table A-8. The tears ranged from a few inches in length to the full length of the flap. The edges of the tears appeared rough, matched when placed together, and demonstrated no material loss or erosion. The NBR was slightly heat affected from the pressurization gap to approximately 1.5 inches forward full circumference. A 0.10 inch char layer was evident in the heat affected area. Axial tears must have occurred after motor burn since there was no unique erosion pattern under the flap.

6.6 RSRM-1A FACTORY JOINT INSULATION

Following the inspection and measurement of the internal insulation, the factory joint internal insulation was cut, and the joints were disassembled. This allowed the joints to be inspected in detail. The inspection of all factory joints is recorded in the following subsections.

6.6.1 RSRM-1A Aft Dome Factory Joint

The RSRM-1A aft dome factory joint was disassembled at the Clearfield H-7 facility on 22 November 1988 at 1915 hours. The insulation condition is recorded in Table A-9.

The Teflon tape, which is used as a stress relief mechanism, was missing from the tang metal interface full circumference. The method for removing the internal insulation over the factory joint also removed any evidence of the Teflon tape. No anomalies were noted.

6.6.2 RSRM-1A Aft Segment Stiffener to Stiffener Factory Joint

The RSRM-1A aft segment stiffener to stiffener factory joint was disassembled at the Clearfield H-7 facility on 22 November 1988 at 2330 hours. The insulation condition is recorded in Table A-10.

The Teflon tape was missing from the tang metal interface full circumference. The method for removing the insulation over the joint caused this. No insulation to case unbonds were noted. No anomalies were noted.

6.6.3 RSRM-1A Aft Segment ET Attach to Stiffener Factory Joint

The RSRM-1A aft segment ET attach to stiffener factory joint was disassembled at the Clearfield H-7 facility on 23 November 1988 at 0400 hours. The insulation condition is recorded in Table A-11.

The Teflon tape was missing on the tang metal interface full circumference. No insulation to case unbonds were noted. No anomalies were noted.

6.6.4 RSRM-1A Aft Center Segment Factory Joint

The RSRM-1A aft center segment factory joint was disassembled at the Clearfield H-7 facility on 9 December 1988 at 0740 hours. The insulation condition is recorded in Table A-12.

The Teflon tape was not in place full circumference due to disassembly operations. No insulation to case unbonds were noted. NBR flashing was present intermittently on the inner clevis leg tip, however, this is considered normal and had no adverse effect on the performance of the joint. No anomalies were noted.

6.6.5 RSRM-1A Forward Center Segment Factory Joint

The RSRM-1A forward center segment factory joint was disassembled at the Clearfield H-7 facility on 16 December 1988 at 2200 hours. The insulation condition is recorded in Table A-13.

The Teflon tape was in place and in good condition on the tang metal interface full circumference. No insulation to case unbonds caused by the disassembly process were noted. The joint looked normal.

6.6.6 RSRM-1A Forward Segment Cylinder to Cylinder Factory Joint

The RSRM-1A forward segment cylinder to cylinder factory joint was disassembled at the Clearfield H-7 facility on 17 January 1989 at 1800 hours. The insulation condition is recorded in Table A-14.

The Teflon tape was in place and in good condition on the tang metal interface full circumference. There was rubber flashing noted on the inner clevis leg tip full circumference which is a normal condition. No insulation to case unbonds caused by the disassembly process were noted. No anomalies were noted.

6.6.7 RSRM-1A Forward Dome Factory Joint

The RSRM-1A forward dome factory joint was disassembled at the Clearfield H-7 facility on 17 January 1989 at 1430 hours. The insulation condition is recorded in Table A-15.

The Teflon tape was in place and intact on the tang metal interface full circumference. Rubber flashing was found on the inner clevis leg tip for most of the circumference, intermittently extending to the primary O-ring. Both of these conditions are considered normal and had no adverse effect on the performance of the joint. No insulation to case unbonds were found on the clevis.

6.7 POSTFIRE EVALUATION OF RSRM-1A PREFIRE DISCREPANCIES

The prefire discrepancy reports for RSRM-1A insulation were evaluated to identify significant items. No items were found that required unique inspections during the postfire evaluation.

7.0 RSRM-1A INSULATION PERFORMANCE EVALUATION

The RSRM-1A segments were insulated to meet the RSRM design drawing requirements (1U75641-01 Aft Dome Insulated, 1U75434-02 Aft Segment Insulated, 1U75428-02 Center Segment Insulated, and 1U75423-02 Forward Segment Insulated). The internal insulation was designed to meet a 2.0 thermal safety factor in the nozzle to case joint, case field joint, and factory joint areas, and a 1.5 thermal safety factor for the acreage insulation for all segments. All safety factor analyses discussed in this report will deal with the above mentioned thermal safety factors.

The insulation was designed using $M + 3\sigma$ material decomposition depths established from the HPM database. References 8 and 9 explain the database analysis and the design methodology, respectively.

The nozzle to case joint, field joints, factory joints, and case wall insulation were evaluated based on the actual safety factor and compliance safety factor as required by the CEI specification. This evaluation was done by the use of prefire and postfire measurements.

Prefire insulation thickness measurements were taken in the aft dome up to the 24.3 inch station by means of a template that was bolted to the nozzle boss. A depth gage was used to measure the distance from the template to the bare metal dome before insulation layup. The measurement was repeated after insulation cure to determine the distance from the template to the insulation surface. The two measurements were then subtracted to determine the prefire insulation thickness. This measurement process was performed a third time after firing and char removal to determine the postfire thickness and material decomposition depth.

Prefire thicknesses at all other locations within the motor were measured using ultrasonic inspection methods.

Postfire insulation thicknesses were determined in the aft segment (forward of the 24.3 inch station), the center segments, and the forward segment by drilling holes in the insulation to the case wall and measuring the insulation thickness with a depth gage.

For the purpose of this report, the nozzle to case joint and the field joints will be dealt with in separate sections. All other areas, including the case acreage, the factory joints, and any other regions requiring a minimum 2.0 safety factor, will be dealt with in the sections devoted to the specific motor segments.

Several axial performance stations previously measured on HPM motors have been moved or eliminated to avoid ply terminations, tapered areas, and other conditions created by the RSRM design. Other locations have been added to provide a more complete database.

Some segment stations had liner material remaining after firing. For analysis purposes, the prefire measurements were used in place of the postfire measurements where liner was remaining, and the MDD was considered to be zero.

Several terms used in this part of the report are defined as follows:

Actual Safety Factor (ASF): The thermal safety factor based on the actual prefire thickness and actual MDD.
ASF = prefire thickness / MDD.

Aft Cylinder: That region of the aft segment forward of 55.0 inches from the nozzle boss.

Aft Dome: That region of the aft segment from the aft face of the nozzle boss to and including 55.0 inches forward of the nozzle boss.

Compliance Safety Factor (CSF): The thermal safety factor based on the MDT and actual MDD. CSF = MDT / MDD.

Exposure Time (E.T.): That amount of time that a particular station is subjected to the internal motor environment. The time measured in seconds and determined by ballistic evaluation (Reference 10).

HPM Database: That set of data derived from static and flight HPM motors and defined in Reference 8.

HPM Database Maximum MDD: The largest single MDD computed for a given axial station in the HPM database.

M + 3σ MDD: The analytically derived MDD values from the HPM database used as the insulation design basis where:
M = the median of the 'within motor' MDD medians
σ = the root sum square of the 'motor to motor' MDD standard deviation (σ_M) and the median of the 'within motor' standard deviations (σ_{MED}) Reference 8.

$$\sigma = (\sigma_M^2 + \sigma_{MED}^2)^{1/2}$$

Material Decomposition Depth (MDD): The amount of material that is decomposed during firing due to erosion or heat effects measured in inches. MDD = prefire thickness - postfire thickness.

Material Decomposition Rate (MDR): The average rate at which material is decomposed as a result of erosion or heat effect. The value is measured in mils (thousandths of an inch) per second and assumes a constant decomposition rate throughout the exposure time. MDR = 1000 X MDD / E.T.

Minimum Design Thickness (MDT): The minimum insulation thickness defined on the 1U design drawings. The thicknesses are designed to meet the appropriate safety factor based on an M + 3σ material decomposition and the HPM design thickness (Reference 9).

Performance Station: An axial location in the segment found by measuring forward from the tang tip (on the forward and center segments) or from the nozzle boss face (on the aft segment). The stations in the forward dome are located by continuing the measurement along the insulation surface contour from the 321.0 inch station. Figure 11 shows the location of the stations within each segment.

7.1 RSRM-1A NOZZLE TO CASE JOINT

The 2.0 safety factor region of the nozzle to case joint area is defined as that area 2 inches to either side of the joint insulation interface, measured along the insulation internal surface contour. Safety factors were evaluated by examining the MDD's at two locations: 1) at the base of the joint stress relief flap gap and 2) on the aft dome insulation at the joint interface.

Visual inspection of the flap gap has revealed that no significant heating occurs in this region. In fact, the Teflon tape which is in the gap is visible after firing. For this reason, no further measurements or inspections in the flap gap were necessary.

The MDD at the nozzle to case joint insulation interface was calculated at 16 planes using the prefire and postfire insulation thickness as measured per Figure 12. The MDT used in the CSF calculations at the nozzle joint was 4.900 inches based on the MDT at the 7.8 and 9.3 inch stations.

The safety factors for the RSRM-1A nozzle to case joint are shown in Table 7. The minimum CSF for the nozzle to case joint was 3.7 at the 0° plane. The minimum ASF was 4.1 also at the 0° plane. The median MDD for the nozzle to case joint was 0.628 inch and ranged from 0.348 to 1.333 inches. The safety factors for the nozzle to case joint exceeded the 2.0 requirement in all areas.

7.2 RSRM-1A FIELD JOINTS

The 2.0 safety factor region of the field joint area is defined as that area 2 inches to either side of the joint insulation interface. The joint safety factors were evaluated by examining the MDD's in three areas: 1) in the pressurization gap, 2) at the 3.5 inch station, and 3) at the joint insulation interface.

From a visual inspection of all field joints, it was apparent that no significant material decomposition had occurred in the area of the pressurization gap terminus. For this reason, no further measurements or inspections in the pressurization gaps were necessary.

The safety factor at the 3.5 inch station for each field joint will be dealt with in the discussion of the respective segments.

The safety factors at the joint insulation interface were calculated using the MDD on the clevis joint insulation. The MDD was calculated using the prefire and postfire thicknesses as measured every 10° per Figure 13. The MDT used in the CSF calculations was 2.595 inches. This minimum is derived by subtracting the maximum 1U inner clevis leg metal thickness of 0.430 inch from the minimum 1U drawing insulation overall thickness of 3.025 inches.

The clevis side of the joint interface sits approximately 0.150 inch radially inboard of the J-leg tip when the joint is assembled. As a result, the clevis side is exposed to a more severe environment and

experiences more material decomposition than the J-leg tip. This tends to inflate the MDD value at the joint. A more realistic approach to calculating the joint safety factors would be to use the tang J-leg insulation. It is not possible, however, to obtain corresponding prefire and postfire measurements because the J-leg does not return to the same position after the joint has been assembled and disassembled. For this reason, the clevis side insulation is used to calculate the joint CSF and ASF and is considered to be quite conservative.

7.2.1 RSRM-1A Aft Field Joint

The safety factors for the RSRM-1A aft field joint insulation interface are shown in Table 8. The minimum CSF for the joint interface was 4.7 at the 180° plane. The minimum ASF was 5.2 also at the 180° plane. The median MDD for the aft field joint was 0.451 inch and ranged from 0.272 to 0.556 inch. The safety factors for the aft field joint exceeded the 2.0 requirement in all areas.

7.2.2 RSRM-1A Center Field Joint

The safety factors for the RSRM-1A center field joint insulation interface are shown in Table 9. The minimum CSF for the joint interface was 8.1 at the 80° plane. The minimum ASF was 8.6 also at the 80° plane. The median MDD for the center field joint was 0.247 inch and ranged from 0.199 to 0.322 inch. The safety factors for the center field joint exceeded the 2.0 requirement in all areas.

7.2.3 RSRM-1A Forward Field Joint

The safety factors for the RSRM-1A forward field joint insulation interface are shown in Table 10. The minimum CSF for the interface was 10.5 at the 350° plane. The minimum ASF was 11.3 also at the 350° plane. The median MDD for the forward field joint was 0.162 inch and ranged from 0 to 0.246 inch. The safety factors for the forward field joint exceeded the 2.0 safety factor requirement in all areas.

7.3 RSRM-1A AFT SEGMENT

For purpose of this analysis, the aft segment is divided into the aft dome region and the aft cylinder region. The aft segment was measured in eight degree planes forward of the 98.0 inch station and at sixteen degree planes at and aft of the 98.0 inch station.

7.3.1 RSRM-1A Aft Dome

The safety factor analysis and the supporting measurement data for the RSRM-1A aft dome are shown in Table 11. All safety factors for the aft dome were acceptable with the minimum CSF being 1.97 at the 48.0 inch station in the 90° plane. The minimum ASF was 2.37 at the 45.0 inch station in the 46.8° plane.

Figure 14 shows how the RSRM-1A aft dome MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following aft dome stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M+3σ MDD	MIN CSF
17.3	1 of 16	1.027	1.564	1.276	1.688	1.675	2.11
45.0	3 of 16	0.866	1.172	1.100	1.285	1.222	2.02
48.0	3 of 16	0.794	1.491	0.939	1.318	1.155	1.97

The prefire and postfire measurements at the 17.3 and 45.0 inch stations were analyzed, and no apparent problems with the recorded data could be seen. The postfire thickness measurements from these stations were retaken and verified. The MDD's at these stations appear to have increased over that typically seen on HPM motors. Although the noted maximum MDD's at these stations exceeded the M + 3σ design MDD's, the minimum CSF's are above the required 1.5 value. These areas will be closely monitored in future motors to determine if the measurements indicate a trend.

The prefire and postfire data for the 48.0 inch station was analyzed. The prefire thicknesses at the 46.8°, 68.4°, and 90° planes were significantly higher than the other prefire data at the same longitudinal location. It appears that the prefire measurements at these degree locations were improperly measured or recorded or that the prefire measurement and the postfire measurement were taken in different locations. Even with this problem, the safety factor is well above the 1.5 requirement.

The 9.3 and 10.7 inch stations in the aft dome showed significantly less material decomposition than was previously seen on HPM motors. This condition is consistent with the RSRM configuration tested to date and is believed to be due, in part, to the edge orientation of the CF/EPDM next to the nozzle to case joint.

7.3.2 RSRM-1A Aft Cylinder

The 68.0, 372.0, 375.0, and 377.5 inch performance stations are new stations beginning with the RSRM motors. The safety factor analysis and the supporting measurement data for the RSRM-1A aft cylinder are shown in Table 12. The performance analysis indicates that there were apparent safety factor violations at three stations in the aft cylinder. A chart listing the locations is shown below:

STATION	DEGREE	CSF	ASF	REQUIRED SF
168.3	0°	1.41	2.22	1.5
	46.8°	1.44	2.27	1.5
299.1	0°	1.02	2.35	2.0
322.0	46.8°	1.49	2.19	1.5

Each of these locations were visually inspected by Insulation Design personnel to determine if any erosion gouging or pocketing had occurred. Also, the locations were inspected for uneven or tapered insulation surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified.

The postfire measurements at the 168.3 inch were taken at the base of the stiffener to stiffener factory joint insulation taper. The 0° and 46.8° planes had prefire thicknesses which were high compared to the

surrounding prefire data. The postfire measurements were comparable to the other planes at this station. This indicates that the prefire measurements were taken on the taper, and the postfire was taken off the taper. This results in an unrealistically high MDD, yielding the low safety factor. In reality, these are not safety factor violations. This station has provided unreliable MDD data in past RSRM experience. Following the recommendations provided in Reference 4, this station will be moved to the 166.0 inches on future motors.

The 299.1 and 322.0 inch stations had prefire thickness measurements that were high in a single plane compared to the surrounding prefire data. The postfire measurements were comparable to the other planes at these stations. Postfire measurements at both locations were taken adjacent to a circumferential ply overlap. These apparent safety factor violations can be attributed to the prefire data taken on or partially on the ply overlap and the postfire taken off it.

The 56.0 and 177.0 inch stations are located in regions which require a 2.0 safety factor. The minimum CSF's at these stations were 2.77 and 2.29, respectively. The minimum ASF's were 3.55 and 3.43, respectively.

Figure 15 shows how the RSRM-1A aft cylinder MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following aft cylinder stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M + 3 σ MDD	MIN CSF
68.0	3 of 16	0.516*	0.745*	0.620	1.307	0.889**	1.68
85.0	1 of 16	0.390	0.611	0.395	0.642	0.618	2.02
168.3	2 of 8	0.284	0.400	0.302	0.603	0.459	1.41
299.1	1 of 8	0.150	0.272	0.212	0.656	0.253	1.02
322.0	1 of 8	0.083	0.185	0.113	0.255	0.197	1.49
339.0	1 of 8	0.066	0.339	0.097	0.233	0.190	1.63
344.0	1 of 8	0.061	0.223	0.126	0.249	0.187	1.53
375.0	1 of 8	0.014*	0.106*	0.098	0.240	0.237*	2.00
377.7	4 of 8	0.014*	0.106*	0.234	0.289	0.237*	1.83

* Data taken from the closest adjacent station.
** Interpolated from adjacent stations.

The prefire measurements at the 68.0 inch station 111.6°, 201.6°, and 338.4° planes were high compared to the surrounding prefire data. The postfire measurements were comparable to the other planes at these stations. This station has provided inconsistent MDD's in past RSRM experience. It is located just forward of the aft dome factory joint on the ramp area. Following the recommendations of Reference 4, this station has proven unreliable and will be eliminated on future motors.

The data at the 168.3, 299.1, and 322.0 inch stations resulted in apparent safety factor violations and were previously discussed.

Further analysis of the data indicates that the 85.0, 339.0, 344.0, and 375.0 inch stations had prefire measurements which were high in a single plane and had normal postfire thicknesses. This resulted in the high MDD's. This could indicate prefire measurements taken at ply overlaps and postfire measurements taken in different locations or improperly measured or recorded data. These stations do not, therefore, generate a concern.

Analysis of the data at the 377.5 inch station indicates that the prefire thickness at the four planes in question were high compared to three of the other four planes. Since the data is evenly divided, no conclusion can be drawn as to which is in error. This station will be monitored in future motors to evaluate trends.

7.4 RSRM-1A AFT CENTER SEGMENT

The aft center segment was measured at eight degree planes. The 3.5, 153.5, and 314.0 inch performance stations are new stations beginning with the RSRM motors. The safety factor analysis and the supporting measurement data for the RSRM-1A aft center segment are shown in Table 13. With the exception of the 161.4 inch station, all safety factors for the aft center segment were acceptable. Other than the above noted exception, the minimum CSF was 1.99 at the 48.0 inch station in the 90° plane, and the minimum ASF was 2.81 also at the 48.0 inch station in the 90° plane.

The 161.4 inch station is located over a factory joint and requires a 2.0 safety factor. Three of the eight degree locations at the 161.4 inch station had apparent safety factor violations as shown below:

DEGREE	CSF	ASF	REQUIRED SF
46.0°	1.51	4.12	2.0
90.0°	1.76	4.74	2.0
136.0°	1.71	4.72	2.0

Each of these locations were visually inspected by Insulation Design personnel to determine if any erosion gouging or pocketing had occurred. Also, the locations were inspected for uneven or tapered insulation surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified.

The postfire measurements at the 161.4 inch station were taken adjacent to an uneven surface. It appears that the prefire measurements were not taken at the same location as the postfire. The 161.4 inch station has provided unreliable data in past RSRM experience. It is located immediately forward of a stack of insulation plies which flow during cure creating uneven surfaces over the factory joint. Reference 4 recommends that Manufacturing Engineering evaluate the purpose and effectiveness of the additional plies and determine if they can be removed, reduced in number, or moved to eliminate the over thick and uneven surface problem.

The 3.5 inch station is also located in a region which requires a 2.0 safety factor. The minimum CSF at the 3.5 inch station was 2.91. The minimum ASF for the 3.5 inch station was 3.80.

Figure 16 shows how the RSRM-1A aft center segment MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following aft center segment stations.

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M + 3 σ MDD	MIN CSF
48.0	6 of 8	0.045*	0.206*	0.112	0.145	0.089**	1.99
161.4	5 of 8	0.025	0.107	0.109	0.156	0.082	1.51

* Data taken from the closest adjacent station.
** Interpolated from adjacent stations.

The prefire and postfire measurements at the 48.0 inch station were analyzed, and no apparent problems with the data could be seen. The postfire thickness measurement was retaken and verified. A similar condition was also noted in QM-7 where 7 of the 8 planes exceed the M + 3σ MDD. Although the noted maximum MDD's at this station exceeded the M + 3σ MDD used to design the insulation, the minimum CSF is above the required 1.5 value. This station will be closely monitored in future motors to determine if the measurements indicate a trend.

The data at the 161.4 inch station resulted in safety factor violations and was previously discussed.

The flap region of the aft center segment of RSRM-1A saw more material decomposition than was typically seen on HPM motors. This condition has been noted on all RSRM static test motors but was not commonly seen on HPM flight motors. This condition will be evaluated on future RSRM static test and flight motors.

7.5 RSRM-1A FORWARD CENTER SEGMENT

The forward center segment was measured at eight degree planes. The 3.5, 153.5, and 314.0 inch performance stations are new stations beginning with the RSRM motors. The safety factor analysis and the supporting measurement data for the RSRM-1A forward center segment are shown in Table 14. The performance analysis indicates that there were apparent safety factor violations at two stations in the forward center segment. A chart listing the locations is shown below:

STATION	DEGREE	CSF	ASF	REQUIRED SF
161.4	0°	0.97	3.13	2.0
	46°	1.89	5.36	2.0
214.1	226°	1.29	2.44	1.5

Each of these locations were visually inspected by Insulation Design personnel to determine if any erosion gouging or pocketing had occurred. Also, the locations were inspected for uneven or tapered insulation surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified.

The 161.4 inch station is located over a factory joint and requires a 2.0 safety factor. The postfire measurements at the 161.4 inch station were taken adjacent to an uneven surface. As in the aft center segment, it appeared that the prefire measurements were not taken at the same location as the postfire measurements. The 161.4 inch station has provided unreliable data in past RSRM experience. Reference 4 recommends that Manufacturing Engineering evaluate the purpose and effectiveness of the additional plies and determine if they can be removed, reduced in number, or moved to eliminate the overthick and uneven surface problem.

The postfire measurement at the 214.1 inch station in the RSRM-1A forward center segment was taken adjacent to a circumferential ply overlap. The variation in the MDD indicates that the prefire measurement was taken at a different location than the postfire measurement.

The 3.5 inch station is also located in a region which requires a 2.0 safety factor. The minimum CSF at this station was 15.59 and the minimum ASF was 17.96.

Figure 17 shows how the RSRM-1A forward center segment MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following forward center segment stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M + 3 σ MDD	MIN CSF
161.4	4 of 8	0	0.087	0.080	0.244	0.082	0.97
214.1	3 of 8	0	0.026	0	0.101	0.029	1.29

Some of the data at the 161.4 and the 214.1 inch stations resulted in safety factor violations. These stations were previously discussed.

Generally, there were greater MDD's on this segment in the flap region than on forward center segments in the HPM database. This is a condition that was seen on all previous RSRM motors but not on HPM flight motors. This condition will be monitored on future RSRM static test and flight motors.

7.6 RSRM-1A FORWARD SEGMENT

The forward segment performance data was separated into two groups: the star tip and non-star tip planes. The star tip planes are defined as the 90°, 154°, 222°, 286°, and 352° planes which lie under the thin portion of the propellant grain. These planes have a higher exposure time than the non-star tip planes. The non-star tip planes are defined as the 74°, 140°, 206°, 270°, and 336° planes. These planes lie under the thick parts of the forward segment propellant grain. The 3.5, 13.0, 215.0, 230.0, 312.0, and 330.0 inch performance stations are new stations beginning with the RSRM motors.

7.6.1 RSRM-1A Forward Segment Star Tip Planes

The safety factor analysis and the supporting measurement data for the RSRM-1A forward segment star tip planes are shown in Table 15. The performance analysis indicates that there were apparent safety factor violations at two stations in the forward segment under the star tip portion of the propellant grain. A chart listing these locations is shown below:

STATION	DEGREE	CSF	ASF	REQUIRED SF
152.0	222°	1.45	2.47	1.5
359.0	222°	1.38	1.88	1.5

Each of these locations were visually inspected by Insulation Design personnel to determine if any erosion gouging or pocketing had occurred. Also, the locations were inspected for uneven or tapered insulation

surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified.

Although only one plane at the 152.0 inch station resulted in a safety factor violation, three of the five planes exceeded the M + 3σ design MDD. Overall, (including the non-star tip planes) five of the ten planes exceeded the M + 3σ MDD. Analysis of the prefire and postfire measurement data indicated that the postfire data was quite uniform and consistent. The prefire data is divided into two groups of five planes with five being high and five being low. The variation between these two groups is approximately 0.20 inch. This variation may be a result of ply overlaps or measurement inaccuracies. The variation in the prefire measurement results in the variation of the MDD's. It also results in a CSF variation of 1.45 to 79.25 at the same station. This apparent safety factor violation can be attributed to the prefire data taken on or partially on the ply overlap and the postfire taken off it. Since the postfire measurements are so uniform, Insulation Design believes the violation to be a result of prefire measurement inaccuracies. This station will be closely monitored on future motors to evaluate trends.

The 359.0 inch station also had a prefire thickness measurement that was high in two planes compared to the surrounding prefire data, although only one of the planes resulted in a safety factor violation. Postfire measurements at this location were adjacent to a ply termination. This apparent safety factor violation can be attributed to the prefire data taken on or partially on the ply termination and the postfire taken off it. This station has provided unreliable MDD data in past RSRM experience. Following the recommendations provided in Reference 4, this station will be moved to 362.0 inches on future motors.

Based on the visual inspection of stations with alleged safety factor violations and based on a careful evaluation of the prefire and postfire thickness measurements, it is believed that there were no safety factor violations in the forward segment star-tip planes.

The 3.5, 162.0, and 321.0 inch stations are located in areas which require a 2.0 safety factor. The minimum CSF's at these stations were 7.91, 4.03 and 3.09, respectively. The minimum ASF's for these stations were 10.31, 6.18, and 3.72, respectively.

Figure 18 shows how the RSRM-1A forward segment star tip MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following forward segment star tip stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M + 3 σ MDD	MIN CSF
3.5	5 of 5	0*	0*	0.214	0.268	0.103*	7.91
152.0	3 of 5	0.032	0.194	0.179	0.219	0.123	1.45
173.0	1 of 5	0.116*	0.241*	0.179	0.337	0.331**	1.62
330.0	1 of 5	0.147*	0.277*	0.214	0.353	0.333**	1.56
359.0	1 of 5	0.150	0.311	0.174	0.378	0.279	1.38
394.0	1 of 5	0.156	0.288	0.250	0.295	0.287	1.71

* Data taken from the closest adjacent station
** Interpolated from adjacent stations

The MDD at the 3.5 inch station was significantly higher than that experienced in the HPM motors. This condition, however, has been noted on all previous RSRM's and is not unexpected. Even with the increased MDD values, the minimum CSF noted at this station was 7.91. This condition will continue to be monitored on future motors.

The data at the 152.0 and the 359.0 inch stations resulted in safety factor violations and was previously discussed.

Analysis of the data at the 173.0 inch station indicates that the prefire data in one plane was high compared to the surrounding prefire data. The postfire data was uniform. This could indicate a ply overlap or incorrectly recorded data, and that prefire data was the cause of the high MDD at this station. The values did not result in safety factor violations and are not a concern.

Both the prefire and postfire thickness measurements at the 330.0 inch station were analyzed and showed significantly more scatter than expected. This is an indication that there may have been difficulties in

taking measurements. The 330.0 inch station is located on a tapered area in the forward dome, which causes difficulty in taking measurements. It is probable that the prefire and postfire measurements were taken at slightly different locations because of the taper in the insulation. This has occurred in past RSRM experience. Following the recommendations provided in Reference 4, this station will be moved to 339.0 inches on future motors.

Analysis of the data at the 394.0 inch station indicated a significant amount of scatter in both the prefire and the postfire data. For this reason, no specific determination about data error can be made. However, the safety factors at this station were acceptable. This station will be closely monitored in future motors to determine if a trend is developing.

7.6.2 RSRM-1A Forward Segment Non-Star Tip Planes

The safety factor analysis and the supporting measurement data for the RSRM-1A forward segment non-star tip planes are shown in Table 16. All safety factors for the forward segment non-star area were acceptable. The minimum CSF was 1.59 at the 152.0 inch station in the 206° plane, and the minimum ASF was 2.41 at the 383.0 inch station in the 270° plane.

The 3.5, 162.0, and 321.0 inch stations are in areas which require a 2.0 safety factor. The minimum CSF's at these stations were 7.91, 4.34, and 4.73, respectively. The minimum ASF's were 10.37, 6.71, and 5.07, respectively.

Figure 19 shows how the RSRM-1A forward segment non-star tip MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following forward segment non-star tip stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M + 3 σ MDD	MIN CSF
3.5	5 of 5	0*	0*	0.240	0.268	0.103*	7.91
152.0	2 of 5	0.011	0.095	0.010	0.199	0.123	1.59
312.0	1 of 5	0.093*	0.198*	0.129	0.311	0.308**	1.68
383.0	1 of 5	0.157	0.268	0.220	0.308	0.295	1.66

* Data taken from the closest adjacent station
** Interpolated from adjacent data.

All five of the locations in the 3.5 inch station exceeded the M + 3σ MDD design criteria. As in the star tip planes, the higher MDD experienced at the 3.5 inch station is consistent with previous RSRM's. The minimum CSF at this station was 7.91 which is well above the 2.0 requirement.

The 152.0 inch station was previously discussed in the RSRM-1A star tip section (Section 7.6.1).

Further analysis of the data indicated that a single plane at the 312.0 and 383.0 inch stations had prefire measurements which were 0.108 and 0.111 inch higher than the adjacent planes. This indicated the possibility of ply overlaps or improperly recorded prefire data. The postfire data did not have similar variations. None of the data resulted in a safety factor violation.

8.0 RSRM-1B VISUAL EVALUATIONS

The following paragraphs discuss the RSRM-1B evaluations. During the postfire evaluation, Insulation Design documented the condition of the external and internal insulation components. A copy of the documentation for RSRM-1B can be found in Appendix B. The condition of the insulation components for each segment is addressed in the following subsections.

8.1 RSRM-1B EXTERNAL INSULATION

8.1.1 RSRM-1B External Factory Joint Weatherseals

The factory joint weatherseal of each joint was visually inspected. No weeping, wet areas at the edges of the weatherseal, or other evidence of moisture within the joint was identified.

The aft segment ET attach to stiffener factory joint weatherseal was selected to determine if moisture was present in the factory joint. After removing the insulation and drilling a hole through the pin retainer band, the segment was rotated to place the hole at bottom dead center. There was no evidence of moisture within the cavity behind the band.

8.1.2 RSRM-1B Stiffener Rings and Stiffener Stubs

The stiffener ring flange EPDM insulation suffered minor gouges from splashdown debris and hydrolasing. The overall flange insulation was present and well bonded. Thermal degradation was observed on the outer flange surface from 220° through 270° to 330° on all rings.

The stiffener ring insulation on RSRM-1B was more severely damaged in comparison to RSRM-1A. The tears were larger, and separations occurred over a 100° arc centered at 150°.

The EPDM insulation on the stiffener stubs was in good shape overall.

8.2 RSRM-1B NOZZLE TO CASE JOINT

The nozzle to case joint performed as expected with no polysulfide blowholes identified across the bondline. Twenty small voids in the polysulfide adhesive were noted at and aft of the step region. These voids were caused by entrapped air in the adhesive and are typical of past RSRM's. None of the voids extended across the entire bondline or were exposed to hot gas. The size and location of the noted voids are contained in Table B-1.

The failure mode of the polysulfide was approximately 90% cohesive within the polysulfide and 10% adhesive at the NBR to polysulfide

interface. A small amount of porosity was noted within the polysulfide bondline at the step region. The vent slots showed an average polysulfide fill of 78% with values ranging from 10% to 100% fill.

The bondline around the circumference demonstrated erosion similar to that observed on RSRM static test motors. The polysulfide bondline was decomposed further into the joint (approximately 6.13 inches from the aft face of the nozzle boss) than the flap erosion. For approximately 0.50 inch further aft (5.63 inches from the aft face of the nozzle boss), the polysulfide was partially decomposed and bubbled. Although the material was partially decomposed, no gas flow had occurred in the adhesive bondline decomposed region.

The insulation erosion in the joint region was similar to the condition of previous RSRM motors. The char layer on the CF/EPDM had swollen to the point that the postfire material thickness near the joint appeared to exceed the prefire material thickness.

The baffle appeared to be in excellent shape. The NBR flap had been heat affected, and several small areas of the inboard 0.5 inch of flap had been torn away from the aft dome and remained with the fixed housing intermittently around the circumference. This is believed to be due to heat soak during motor descent.

8.3 RSRM-1B FIELD JOINTS

8.3.1 RSRM-1B Aft Field Joint

The aft field joint insulation configuration performed as designed. The tang and clevis joint insulation were in excellent condition. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table B-2.

The general appearance of the pressure sensitive adhesive was noted. Contact within the joint was based on the matted appearance and flat texture of the adhesive. Non-contact was based on the glossy appearance of the adhesive. The joint appeared to have made contact full circumference at the tip of the J-leg. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg

to an average of 1.35 inches outboard of the material remaining (Figure 20). A minimum radial contact of 0.75 inches was measured at 45°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-ring was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot, charred insulation, and a small amount of particulate slag.

Edge separations were identified on both the clevis and tang of this joint during the prefire inspection. The tang insulation edge separations identified were not repaired while the clevis insulation edge separations were repaired. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. The deepest clevis edge separation, 0.29 inch axial depth, was identified at 142° which had grown from 0.12 inch prefire. During prefire inspection, the maximum clevis edge separation identified and repaired was 1.70 inches at 323°. No separation was noted postfire at 323°. This is documented on Table 5. The largest tang separation found was 0.35 inch deep at 82°, which had grown from a region of no prefire separation. The largest prefire separation, 0.07 inch at 117° and 178° - 183°, grew to 0.25 inch. These separations are documented on Table 6. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

8.3.2 RSRM-1B Center Field Joint

The center field joint insulation configuration performed as designed. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table B-3.

The general appearance of the pressure sensitive adhesive was noted. Contact and non-contact within the joint was based on the matted appearance and flat texture or the glossy appearance of the adhesive. The joint appeared to have made contact full circumference at the tip of the J-leg. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg to an average of 1.12 inches outboard of the material remaining (Figure 21). A minimum radial contact of 0.92 inches was measured at 248°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-rings was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot and charred insulation.

Edge separations were identified on the clevis and tang of this joint during the prefire inspection. Clevis separations were repaired and tang separations were not. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. As referenced on Table 5, the deepest clevis edge separation, 0.36 inch axial depth, was identified at 6°. No separation was present prefire at this location. During prefire inspection, the maximum clevis edge separation identified and repaired was 0.91 inch at 115° - 122°. This opened up only to 0.21 inch postfire. The largest tang separations found during postfire inspection were 0.20 inch deep at four locations. The prefire separations at these locations ranged from no depth to 0.18 inch depth. The largest prefire separation, 0.19 inch at 284° - 286°, measured 0.15 inch postfire. This is documented on Table 6. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

8.3.3 RSRM-1B Forward Field Joint

The forward field joint insulation configuration performed as designed. The inboard surfaces of the joint insulation were nominally charred with some heat affected areas outboard of the char layer. Measurements of the tang material char depths and heat affected depths are provided in Table B-4.

The general appearance of the pressure sensitive adhesive was noted. The joint appeared to have made contact full circumference at the tip of the J-leg. The adhesive appeared matted with a flat texture. The bondline contact was measured at 0°, 90°, 180°, and 270°. Based on these four measurements, the deflected J-leg appeared to have made contact from the tip of the J-leg to an average of 0.98 inches outboard of the material remaining (Figure 22). A minimum radial contact of 0.73 inch was measured at 0°. Good contact was observed through the radius region full circumference.

No evidence of motor chamber pressure past the J-joint insulation was identified. No heat effect or erosion of the capture feature O-ring, primary O-ring, or secondary O-ring was identified. No evidence of foreign material, cracks, or crazing was identified on the joint insulation bondline surfaces.

Soot deposits extending down the bondline into the start of the radius were identified at several locations around the circumference (Figure 5). This observation is similar to the condition noted on the RSRM-1A forward field joint. These sooted regions frequently corresponded to large radial inhibitor tears. The initial appearance could be construed to be chamber gas leakage into the joint bondline, but the soot was readily removable with solvent. The pressure sensitive adhesive in these regions was still tacky to the touch and showed no signs of heat effect. This sooting is believed to have occurred in conjunction with the phenomena which generates the radial tears in the NBR inhibitor stubs.

The J-joint pressurization gap was full of charred material full circumference. The charred material consisted of soot, charred insulation, and a small amount of particulate slag.

Edge separations were identified on both the clevis and tang of this joint during the prefire inspection. The tang insulation edge separations identified were not repaired while the clevis insulation edge separations were repaired. The clevis and tang insulation edge separations were mapped during postfire inspection at Clearfield H-7. The deepest clevis edge separation, 0.31 inch axial depth, was identified at 256°, which is shown on Table 5. During the prefire inspection, it measured 0.11 inch at this location. The largest clevis prefire separation measured 0.44 inch at 155° - 158°. No separation was measured here postfire. The largest tang separation postfire, located at 94°, measured 0.35 inch. No separation was noted here prefire. The largest tang separation prefire was 0.13 inch at 306°, which measured 0.25 inch postfire. This is summarized in Table 6. Detailed results of the clevis and tang edge separation investigation can be found in Reference 5.

8.4 RSRM-1B IGNITER TO CASE JOINT

The condition of the igniter boss insulation was good. An evaluation of the insulation to case interface revealed loose insulation flashing full circumference forward of the chamfer. This flashing should have been trimmed prior to igniter installation. The insulation was securely bonded to the case outboard of the chamfer region. The condition of the igniter internal and external insulation is discussed in a separate document (Reference 6).

8.5 RSRM-1B SEGMENT INTERNAL INSULATION

8.5.1 RSRM-1B Aft Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Measurements of the remaining inhibitor stub heights were taken inboard from the I.D. surface of the inner clevis leg every 30° and are contained in Table B-5. The remaining inhibitor stub heights for this motor were within the expected tolerance band.

There was no liner remaining in the aft segment. This condition is common for an aft segment.

The erosion in the aft dome was similar to past flight motors. The NBR under the CF/EPDM was not exposed, and the insulation in the aft dome did not appear to be eroded as severely as previous RSRM static motors.

No evidence of blisters, discolorations, repairs, separations, delaminations, or excessive erosion was identified.

8.5.2 RSRM-1B Aft Center Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Measurements from the I.D. surface of the inner clevis leg to the tip of the remaining NBR inhibitor stub were taken every 30° and are contained in Table B-6. The remaining inhibitor stub heights for this motor were within the expected tolerance band.

Liner coverage in the aft center segment was heavy near the clevis end and completely missing aft of the factory joint. Small patches of thin liner were present on the insulation over the factory joint. A diagram of the liner pattern is shown on Figure 23.

The castable inhibitor was completely missing full circumference which is typical of an aft center segment.

The stress relief flap was eroded back to the flap bulb full circumference which is typical. Measurements of the missing flap were taken every 90° and are shown in Table B-6. The CF/EPDM under the flap was missing full circumference.

8.5.3 RSRM-1B Forward Center Segment Acreage Insulation

The forward facing NBR inhibitor stub exhibited uniform erosion full circumference. Eleven radial tears greater than 3 inches long were noted. Eight of the eleven tears extended radially outward to approximately 5 inches inboard of the clevis I.D. surface. The edges of the tears appeared rough, matched when placed together, and demonstrated no material loss or erosion. This indicated that the tears occurred after motor burn. The location and length of the tears are shown in Table B-7 and Figure 24. The radial extent and frequency of the tears identified in the inhibitor stubs are within the range of tears noted on past flight motors.

Measurements from the I.D. surface of the inner clevis leg to the tip of the remaining NBR inhibitor stub were taken every 30° and are contained in Table B-7. The remaining inhibitor stub heights for this motor were within the expected tolerance band.

Liner coverage for the forward center segment was heavy near the clevis end and light of the factory joint. Small patches of thin liner were present on the insulation over the factory joint. A diagram of the liner pattern is shown in Figure 25.

The castable inhibitor was completely missing full circumference which is typical of a forward center segment.

The stress relief flap was eroded back to approximately 12.5 inches from the tip of the tang full circumference. Axial measurements from the tip of the tang to the aft edge of the remaining flap were taken every 90° and are shown in Table B-7. The CF/EPDM under the flap was heat affected and present full circumference.

A small gouge or cut caused by splashdown debris was identified in the insulation surface 4 inches aft of the NBR inhibitor base at 170°. Based on the jagged non-eroded edges of the cut, the damage appears to have occurred after motor burn.

8.5.4 RSRM-1B Forward Segment Acreage Insulation

The eleven point star pattern in the liner was easily distinguishable, and the star and non-star liner termination points were comparable to past flight motors (Figure 26). The liner remaining at the star tip regions was present from the tip of the tang forward to 142 inches. The liner remaining at the non-star tip regions was present from the tip of the tang forward to 148.5 inches.

The castable inhibitor was completely missing full circumference including the material normally present in the castable inhibitor slot.

The stress relief flap including the castable inhibitor slot was intact full circumference with no significant erosion. Seventy-five axial tears were present over the length of the remaining flap. Measurements of these tears are contained in Table B-8. The edges of the tears appeared rough, matched when placed together, and demonstrated no material loss or erosion. Axial tears must have occurred after motor

burn since there was no unique erosion pattern under flap. This condition has not been documented on any previous flight, but was similar to that seen on the RSRM-1A forward segment.

A small gouge or cut caused by splashdown debris was identified in the insulation surface 107 inches forward of the tip of the tang at 330°. Based on the jagged non-eroded edges of the cut, the damage appears to have occurred after motor burn.

8.6 RSRM-1B FACTORY JOINT INSULATION

Following the inspection and measurement of the internal insulation, the factory joint internal insulation was cut, and the joints were disassembled. This allowed the joints to be inspected in detail. The inspection of all factory joints is recorded in the following subsections.

8.6.1 RSRM-1B Aft Dome Factory Joint

The RSRM-1B aft dome factory joint was disassembled at the Clearfield H-7 facility on 03 December 1988 at 1240 hours. The insulation condition is recorded in Table B-9.

The Teflon tape, which is used as a stress relief mechanism, was intact and in-place on the tang metal interface for the full circumference. A nominal amount of rubber flashing was found on the inner clevis leg tip. This condition is considered normal and did not have any adverse effect on the performance of the joint. No insulation to case unbonds were found. No anomalies were noted.

8.6.2 RSRM-1B Aft Segment Stiffener to Stiffener Factory Joint

The RSRM-1B aft segment stiffener to stiffener factory joint was disassembled at the Clearfield H-7 facility on 04 December 1988 at 0900 hours. The insulation condition is recorded in Table B-10.

The Teflon tape was not visible on the tang end of the factory joint. This is primarily a result of the factory joint disassembly process. Very little rubber flashing was found on the inner clevis leg. No insulation to case unbonds were noted. The joint condition was normal.

8.6.3 RSRM-1B Aft Segment ET Attach to Stiffener Factory Joint

The RSRM-1B aft segment ET attach to stiffener factory joint was disassembled at the Clearfield H-7 facility on 04 December 1988 at 0900 hours. The insulation condition is recorded in Table B-11.

The Teflon tape was not present on the tang metal interface, and this was caused during disassembly. No unbonds were identified on the tang and clevis side of the joint. No anomalies were noted.

8.6.4 RSRM-1B Aft Center Segment Factory Joint

The RSRM-1B aft center segment factory joint was disassembled at the Clearfield H-7 facility on 5 January 1989 at 1200 hours. The insulation condition is recorded in Table B-12.

The teflon tape was in place on the tang metal interface full circumference. No unbonds or anomalies were noted on the tang or clevis side of the joint.

8.6.5 RSRM-1B Forward Center Segment Factory Joint

The RSRM-1B forward center segment factory joint was disassembled at the Clearfield H-7 facility on 9 January 1989 at 0950 hours. The insulation condition is recorded in Table B-13.

The Teflon tape was in place and in good condition on the tang metal interface full circumference. There was intermittent rubber flashing noted on the inner clevis leg tip full circumference. This is a normal condition. No insulation to case unbonds were noted.

8.6.6 RSRM-1B Forward Segment Cylinder to Cylinder Factory Joint

The RSRM-1B forward segment cylinder to cylinder factory joint was disassembled at the Clearfield H-7 facility on 6 February 1989 at 0400 hours.

Insulation Design was not notified of this joint demate, hence they were not present for inspection. However, Structural Applications engineering was present and reported back that there were no anomalies.

8.6.7 RSRM-1B Forward Dome Factory Joint

The RSRM-1B forward dome factory joint was disassembled at the Clearfield H-7 facility on 3 February 1989 at 1810 hours. The insulation condition is recorded in Table B-14.

The Teflon tape was in place and intact on the tang metal interface intermittently full circumference. A minimal amount of rubber flashing was found on the inner clevis leg tip intermittently full circumference. Both of these conditions are considered normal and had no adverse effect on the performance of the joint. No insulation to case unbonds were found on the clevis.

8.7 POSTFIRE EVALUATION OF RSRM-1B PREFIRE DISCREPANCIES

The prefire discrepancy reports for RSRM-1B insulation were evaluated to identify significant items. No items were found that required unique inspections during the postfire evaluation.

9.0 RSRM-1B INSULATION PERFORMANCE EVALUATION

The RSRM-1B segments were insulated to meet the RSRM design drawing requirements (1U75641-01 Aft Dome Insulated, 1U75434-02 Aft Segment Insulated, 1U75428-02 Center Segment Insulated, and 1U75423-02 Forward Segment Insulated). The performance analysis on the RSRM-1B motor was conducted in the same manor as previously explained for the RSRM-1A motor.

9.1 RSRM-1B NOZZLE TO CASE JOINT

The safety factors for the nozzle to case joint are shown in Table 17. The minimum CSF for the nozzle to case joint was 6.1 at the 90° plane. The minimum ASF was 6.9 also at the 90° plane. The median MDD for the nozzle to case joint was 0.624 inch and ranged from 0.467 to 0.798 inch. The safety factors for the nozzle to case joint exceeded the 2.0 requirement in all areas.

9.2 RSRM-1B FIELD JOINTS

9.2.1 RSRM-1B Aft Field Joint

The safety factors for the RSRM-1B aft field joint insulation interface are shown in Table 18. The minimum CSF for the joint interface was 5.2 at the 50° and 230° planes. The minimum ASF was 5.5 at the 230° plane. The median MDD for the aft field joint was 0.429 inch and ranged from 0.254 to 0.498 inch. The safety factors for the aft field joint exceeded the 2.0 requirement in all areas.

9.2.2 RSRM-1B Center Field Joint

The safety factors for the RSRM-1B center field joint insulation interface are shown in Table 19. The minimum CSF for the joint interface was 10.7 at the 20° plane. The minimum ASF was 11.3 also at the 20° plane. The median MDD for the center field joint was 0.192 inch and ranged from 0.152 to 0.242 inch. The safety factors for the center field joint exceeded the 2.0 requirement in all areas.

9.2.3 RSRM-1B Forward Field Joint

The safety factors for the RSRM-1B forward field joint insulation interface are shown in Table 20. The minimum CSF for the interface was 16.4 at the 180° plane. The minimum ASF was 17.3 also at the 180° plane. The median MDD for the forward field joint was 0.083 inch and ranged from 0.013 to 0.158 inch. The safety factors for the forward field joint exceeded the 2.0 safety factor requirement in all areas.

9.3 RSRM-1B AFT SEGMENT

9.3.1 RSRM-1B Aft Dome

The safety factor analysis and the supporting measurement data for the RSRM-1B aft dome are shown in Table 21. All safety factors for the aft dome were acceptable with the minimum CSF being 2.05 at the 42.0 inch station in the 270° plane. The minimum ASF was 2.39 also, at the 42.0 inch station in the 270° plane.

Figure 27 shows how the RSRM-1B aft dome MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD was exceeded at the following aft dome station:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1A MED MDD	RSRM-1A MAX MDD	M+3σ MDD	MIN CSF
33.0	1 of 16	0.789	1.291	1.264	1.414	1.399	2.26

The prefire and postfire measurements at the 33.0 inch station were analyzed, and no apparent problems with the data could be seen. The postfire measurement was retaken and verified. Although the noted maximum MDD at this station exceeded the M + 3σ design MDD, the minimum CSF is above the required 1.5 value. This area will be closely monitored in future motors to determine if the measurements indicate a trend.

The 9.3 and 10.7 inch stations in the aft dome showed significantly less material decomposition than was previously seen on HPM motors. This condition is consistent with the RSRM configuration tested to date and is believed to be due, in part, to the edge orientation of the CF/EPDM next to the nozzle to case joint.

9.3.2 RSRM-1B Aft Cylinder

The safety factor analysis and the supporting measurement data for the RSRM-1B aft cylinder are shown in Table 22. All safety factors for the aft cylinder were acceptable. The minimum CSF was 1.73 at the 68.0 inch station in the 21.6° plane, and the minimum ASF was 2.20 at the 145.5 inch station in the 136.8° plane.

The 56.0, 177.7, and 299.1 inch stations are located in regions which require a 2.0 safety factor. The minimum CSF's at these stations were 2.80, 2.49 and 2.40, respectively. The minimum ASF's were 3.51, 3.76 and 4.18, respectively.

Figure 28 shows how the RSRM-1B aft cylinder MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following aft cylinder stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1B MED MDD	RSRM-1B MAX MDD	M + 3 σ MDD	MIN CSF
68.0	1 of 16	0.516*	0.745*	0.672	1.273	0.889**	1.73
72.0	1 of 16	0.516	0.745	0.490	1.137	0.817	1.76
227.3	1 of 8	0.210	0.378	0.255	0.320	0.317	2.03
283.9	1 of 8	0.126	0.193	0.159	0.257	0.251	1.75
299.1	1 of 8	0.150	0.272	0.175	0.279	0.253	2.40
344.0	1 of 8	0.061	0.223	0.126	0.214	0.187	1.78
363.0	1 of 8	0.034	0.126	0.067	0.194	0.179	1.96

* Data taken from the closest adjacent station.
** Interpolated from adjacent stations.

The postfire thickness measurements from all of the stations listed above were retaken and verified.

The prefire measurement at the 68.0 inch station 21.6° plane was high compared to the surrounding prefire data. The postfire measurement was comparable to the other planes at this station. This station has provided inconsistent MDD's in past RSRM experience. It is located just forward of the aft dome factory joint on the ramp area. Following the recommendations of Reference 4, this station has proven unreliable and will be eliminated on future motors.

Further analysis of the data indicates that the 72.0, 283.9, 299.1, and 363.0 inch stations had prefire measurements which were high in a single plane and had normal postfire thicknesses. This results in the high MDD's. This could indicate prefire measurements taken at ply overlaps and postfire measurements taken in different locations, or improperly measured or recorded data. These stations do not, therefore, generate a concern.

The prefire and postfire measurements at the 227.3 and 344.0 inch stations were analyzed, and no apparent problems with the data could be seen. The postfire measurements at these locations were retaken and verified. Although the noted maximum MDD's at these stations exceeded the M + 3σ design MDD's, the minimum CSF's were above the required 1.5 value. These areas will be closely monitored in future motors to determine if the measurements indicate a trend.

9.4 RSRM-1B AFT CENTER SEGMENT

The safety factor analysis and the supporting measurement data for the RSRM-1B aft center segment are shown in Table 23. All safety factors for the aft center segment were acceptable. The minimum CSF was 2.03 at the 153.5 inch station in the 136° plane, and the minimum ASF was 2.46 at the 71.5 inch station in the 90° plane.

The 3.5 and 161.4 inch stations are located in regions which require a 2.0 safety factor. The minimum CSF's at these stations were 3.42 and 4.92, respectively. The minimum ASF's for these stations were 4.67 and 11.42, respectively.

Figure 29 shows how the RSRM-1B aft center segment MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following aft center segment stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1B MED MDD	RSRM-1B MAX MDD	M + 3 σ MDD	MIN CSF
44.6	1 of 8	0.026	0.141	0.062	0.098	0.090	3.67
48.0	3 of 8	0.045*	0.206*	0.084	0.113	0.089**	2.55
153.5	1 of 8	0.007*	0.053*	0.048	0.064	0.059**	2.03
214.1	3 of 8	0.001	0.043	0.025	0.041	0.029	3.17
280.0	1 of 8	0	0.061	0	0.017	0.005	5.29
307.8	1 of 8	0*	0.041*	0	0.034	0.003**	2.65
311.8	4 of 8	0	0.020	0.009	0.030	0.003	3.00
314.0	3 of 8	0*	0.009*	0	0.023	0.003**	3.91

* Data taken from the closest adjacent station.
** Interpolated from adjacent stations.

The prefire and postfire measurements at the stations listed above were analyzed, and no apparent problems with the data could be seen. The postfire measurements were retaken and verified at most of the locations. The above locations are all in low exposure regions which are very sensitive to measurement error. Although the noted maximum MDD's at these stations exceeded the M + 3σ MDD's used to design the insulation, the minimum CSF's were above the required 1.5 value. These stations will be closely monitored in future motors to determine if the measurements indicate a trend.

The flap region of the aft center segment of RSRM-1B saw more material decomposition than was typically seen on HPM motors. This condition has been noted on all RSRM static test motors but was not commonly seen on HPM flight motors. This condition will be evaluated on future RSRM static test and flight motors.

9.5 RSRM-1B FORWARD CENTER SEGMENT

The safety factor analysis and the supporting measurement data for the RSRM-1B forward center segment are shown in Table 24. All safety factors for the forward center segment were acceptable. The minimum CSF was 2.32 at the 153.5 inch station in the 270° plane, and the minimum ASF was 3.23 at the 39.7 inch station in the 90° plane.

The 3.5 and 161.4 inch stations are located in regions which require a 2.0 safety factor. The minimum CSF's at these stations were 5.84 and 13.88, respectively. The minimum ASF's were 7.63 and 30.06, respectively.

Figure 30 shows how the RSRM-1B forward center segment MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ MDD was exceeded at the following forward center segment station:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1B MED MDD	RSRM-1B MAX MDD	M + 3 σ MDD	MIN CSF
48.0	1 of 8	0.025*	0.299*	0.022	0.092	0.089**	3.13

* Data taken from the closest adjacent station.
** Interpolated from adjacent stations.

The prefire and postfire measurements at the 48.0 inch station were analyzed, and the prefire data was high at two degree planes although only one of the planes exceeded the M + 3σ MDD criteria. The postfire measurement data was all relatively consistent. The postfire measurement was retaken and verified. Although the noted maximum MDD at this station exceeded the M + 3σ MDD used to design the insulation, the minimum CSF was above the required 1.5 value.

Generally, there were greater MDD's on this segment in the flap region than on forward center segments in the HPM database. This is a condition that was seen on all previous RSRM motors but not on HPM flight motors. This condition will be monitored on future RSRM static test and flight motors.

9.6 RSRM-1B FORWARD SEGMENT

9.6.1 RSRM-1B Forward Segment Star Tip Planes

The safety factor analysis and the supporting measurement data for the RSRM-1B forward segment star tip planes are shown in Table 25. The performance analysis indicates that there were apparent safety factor violations at two stations in the forward segment under the star tip portion of the propellant grain. A chart listing these locations is shown below:

STATION	DEGREE	CSF	ASF	REQUIRED SF
171.0	154°	1.41	2.46	1.5
	222°	1.18	2.24	1.5
	352°	1.03	2.15	1.5
347.0	286°	1.28	1.85	1.5

Each of these locations were visually inspected by Insulation Design personnel to determine if any erosion gouging or pocketing had occurred. Also, the locations were inspected for uneven or tapered insulation surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified.

The postfire measurements at the 171.0 inch station were taken adjacent to the factory joint taper. Although only three planes showed safety factor violations, all five planes exceeded the M + 3σ MDD criteria. Additionally, two planes at this station for the non-star tip planes exceeded the M + 3σ MDD, and one of those resulted in a safety factor violation. This indicates that the prefire measurement was taken on the ramp, and the postfire measurement was taken off the ramp. This resulted in an unrealistically high MDD and a low safety factor. The

apparent safety factor violations, can therefore, be attributed to the prefire measurements taken on or partially on the tapered surface and the postfire taken at a different location. This station has provided unreliable MDD data in past RSRM experience. Following the recommendations in Reference 4, this station will be eliminated.

The 347.0 inch station had a prefire measurement which was high at the degree location in question compared to the surrounding prefire data. Also, two planes in the non-star tip region at this station showed a safety factor violation and prefire condition. The postfire data at these locations were consistent with the surrounding data. The postfire thickness measurements were taken adjacent to a ply termination. This apparent safety factor violation can be attributed to the prefire data taken on or partially on the ply termination and the postfire taken off the termination. This station has provided unreliable MDD data in past RSRM experience. Following the recommendations provided in Reference 4, this station will be moved to 350.0 inches in future motors.

Based on the visual inspection of stations with alleged safety factor violations and based on a careful evaluation of the prefire and postfire thickness measurements, it is believed that there were no safety factor violations in the forward segment star-tip planes.

The 3.5, 162.0, and 321.0 inch stations are located in areas which require a 2.0 safety factor. The minimum CSF's at these stations were 18.43, 3.04 and 2.59, respectively. The minimum ASF's for these stations were 22.82, 4.64, and 2.61, respectively.

Figure 31 shows how the RSRM-1B forward segment star tip MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ design MDD's were exceeded at the following forward segment star tip stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1B MED MDD	RSRM-1B MAX MDD	M + 3 σ MDD	MIN CSF
3.5	1 of 5	0*	0*	0.074	0.115	0.103*	18.43
171.0	5 of 5	0.116	0.241	0.387	0.528	0.335	1.03
347.0	1 of 5	0.150	0.243	0.219	0.409	0.307	1.28
383.0	1 of 5	0.151	0.250	0.165	0.314	0.295	1.63
394.0	2 of 5	0.156	0.288	0.232	0.315	0.287	1.60

* Data taken from the closest adjacent station
** Interpolated from adjacent stations

The MDD at the 3.5 inch station was higher than that experienced in the HPM motors. This condition, however, has been noted on all previous RSRM's and is not unexpected. Even with the increased MDD values, the minimum CSF noted at this station was 18.43. This condition will continue to be monitored on future motors.

The data at the 171.0 and the 347.0 inch stations resulted in safety factor violations and were previously discussed.

Analysis of the data at the 383.0 and 394.0 inch stations indicates that the prefire data at the degree locations in question was high compared to the surrounding prefire data. The postfire data was comparable. This could indicate a ply overlap or incorrectly recorded data. The prefire data was the cause of the high MDD's at these locations. The values did not result in safety factor violations and are not a concern.

9.6.2 RSRM-1B Forward Segment Non-Star Tip Planes

The safety factor analysis and the supporting measurement data for the RSRM-1B forward segment non-star tip planes are shown in Table 26. The performance analysis indicates that there were apparent safety factor violations at two stations in the forward segment in the non-star tip portion of the propellant grain. A chart listing these locations is shown below:

STATION	DEGREE	CSF	ASF	REQUIRED SF
171.0	206°	1.49	2.73	1.5
347.0	270°	1.41	2.17	1.5
	336°	1.35	2.05	1.5

Each of these locations were visually inspected by Insulation Design personnel to verify that no erosion gouging or pocketing had occurred. In addition, the locations were inspected for uneven or tapered insulation surfaces which may have affected prefire thickness measurement accuracy. The postfire insulation thickness measurements were also retaken and verified. Both of these stations also resulted in safety factor violations in the RSRM-1B forward segment star tip planes and were previously discussed in detail.

The 3.5, 162.0, and 321.0 inch stations are in areas which require a 2.0 safety factor. The minimum CSF's at these stations were 3.86, 5.66, and 4.17, respectively. The minimum ASF's were 5.30, 8.24, and 4.29, respectively.

Figure 32 shows how the RSRM-1B forward segment non-star tip MDD's compare with the HPM database median MDD's and the M + 3σ design MDD's.

The M + 3σ MDD's were exceeded at the following forward segment non-star tip stations:

(All Dimensions in Inches)

STATION	PLANES	HPM MED MDD	HPM MAX MDD	RSRM-1B MED MDD	RSRM-1B MAX MDD	M + 3 σ MDD	MIN CSF
3.5	4 of 5	0*	0*	0.160	0.549	0.103*	3.86
13.0	1 of 5	0*	0*	0.072	0.232	0.101**	2.80
171.0	2 of 5	0.104	0.316	0.328	0.366	0.335	1.49
347.0	2 of 5	0.107	0.349	0.179	0.388	0.307	1.35
359.0	1 of 5	0.124	0.246	0.149	0.286	0.279	1.82

* Data taken from the closest adjacent station
** Interpolated from adjacent data.

Four of the locations in the 3.5 inch station exceeded the M + 3σ MDD design criteria. As in the star tip planes, the higher MDD experienced at the 3.5 inch station is consistent with previous RSRM's. The minimum CSF at this station was 3.86 which is well above the 2.0 requirement.

Further analysis of the data indicates that one plane at the 13.0 inch station had a prefire measurement which was a minimum of 0.165 inch higher than the adjacent planes. This indicates the possibility of ply

overlaps or improperly recorded prefire data. The postfire data did not have similar variations. The data did not result in a safety factor violation.

The data at the 171.0 and the 347.0 inch stations resulted in safety factor violations and were previously discussed.

Analysis of the data at the 359.0 inch station indicates that the prefire measurements were high in two planes compared to the surrounding prefire data. Only one plane resulted in a high MDD due to a postfire measurement at the plane. Postfire measurements at this location were adjacent to a ply termination. This high MDD can be attributed to the prefire data taken on or partially on the ply termination and the postfire taken off it. This station has provided unreliable MDD data in past RSRM experience. Following the recommendations provided in Reference 4, this station will be moved to 362.0 inches in future motors.

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2. TWR-18680 Vol. III, "KSC Postfire Engineering Evaluation Limits, Insulation Component", J. Bailey and V. Chandler, 26 September 1988.

3. TWR-18888, "STS-26 Squawks and Problem Reports from KSC Postflight Evaluation", J. R. Garfield, 8 November 1988.

4. TWR-19167, "Internal Insulation Inspection", J. Cook, March 1989.

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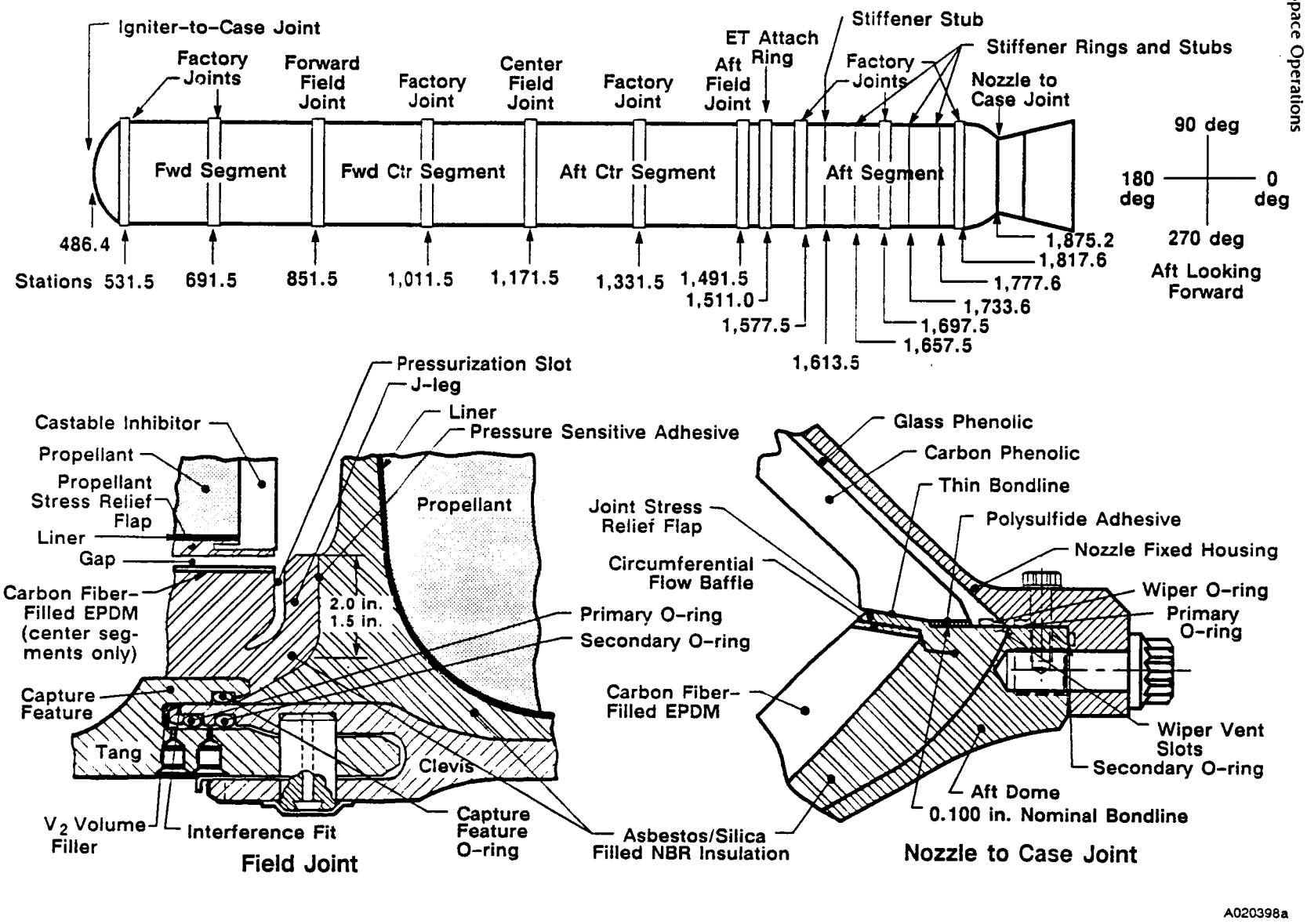
7. Memo L232-FY89-M059, "Inhibitor Database", B. Cannon, November 1988.

8. TWR-16278 Rev. A, "HPM Internal Insulation Database for the RSRM Design", J. Passman, 5 August 1988.

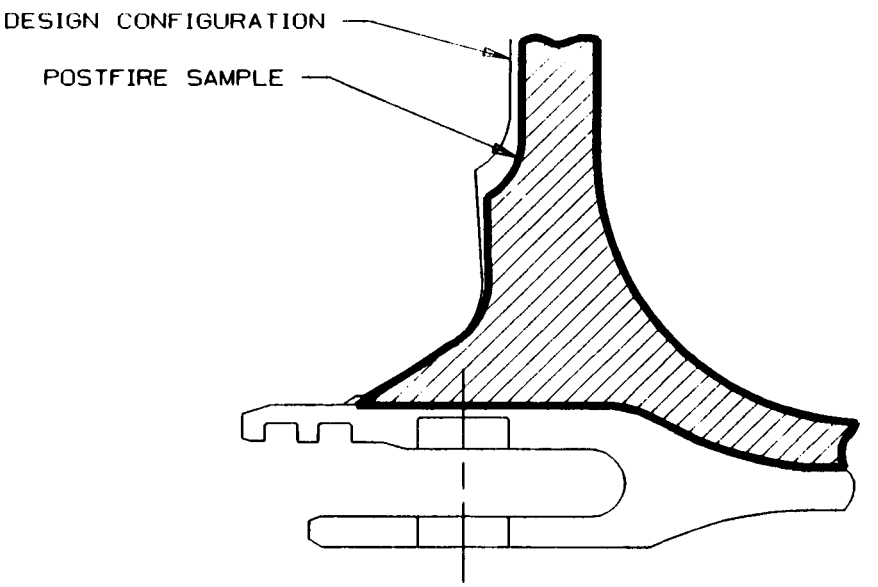
9. TWR-18133 Rev. A, "RSRM Internal Insulation Design Summary", J. Passman and S. Hicken, September 1988.

10. Interoffice Memo, L211-FY89-M062, "RSRM Insulation Exposure Times", B. Laubacher, 6 January 1989.

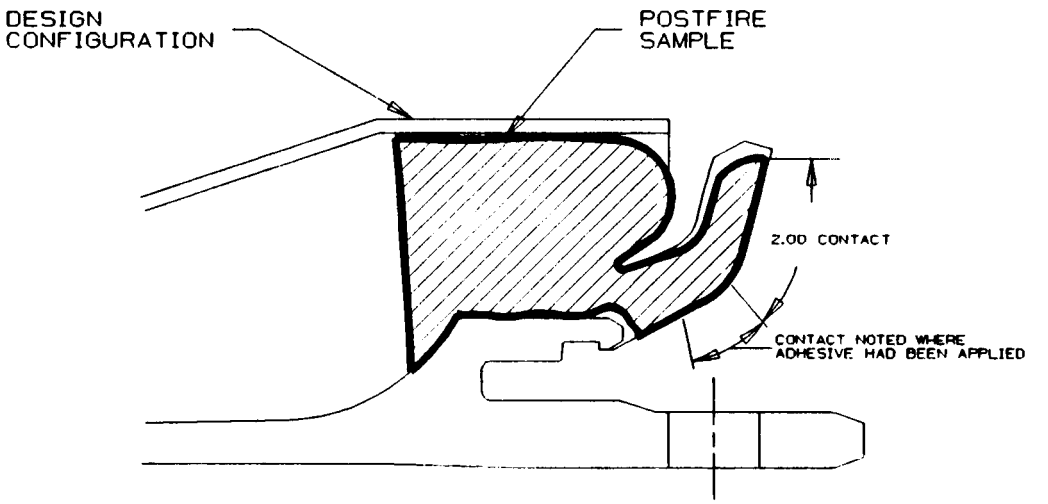


RSRM Motor Configuration

FIGURE 1



AFT CLEVIS
AT 0°

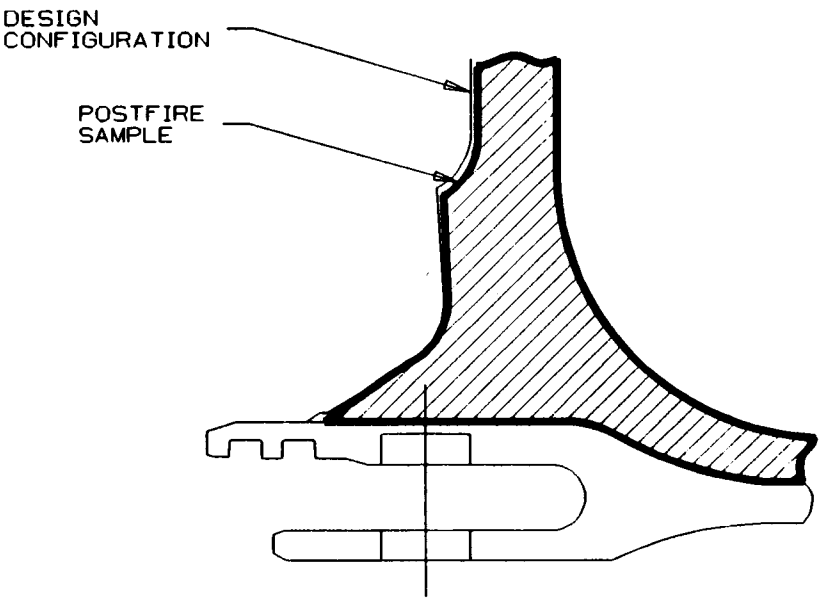


AFT/CTR TANG
AT 2°

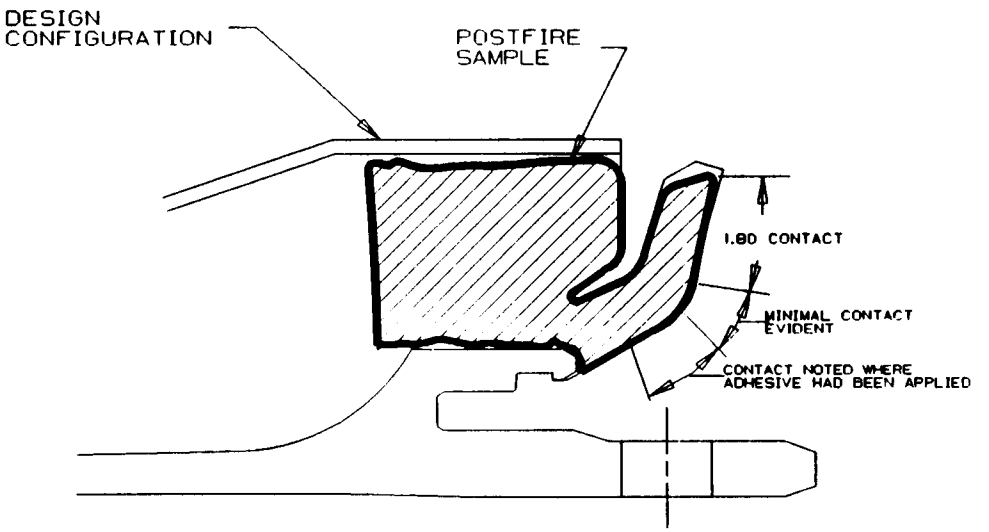
RSRM-1A AFT FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 2



AFT/CTR CLEVIS
AT 272°

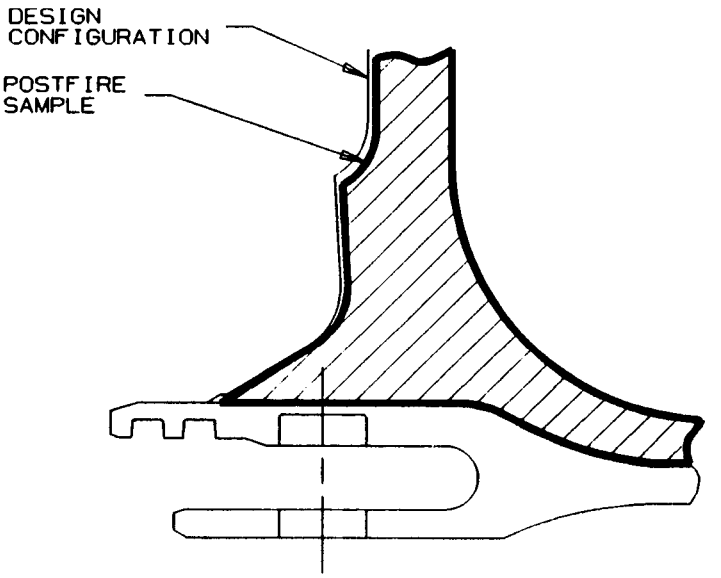


FWD./CTR TANG
AT 280°

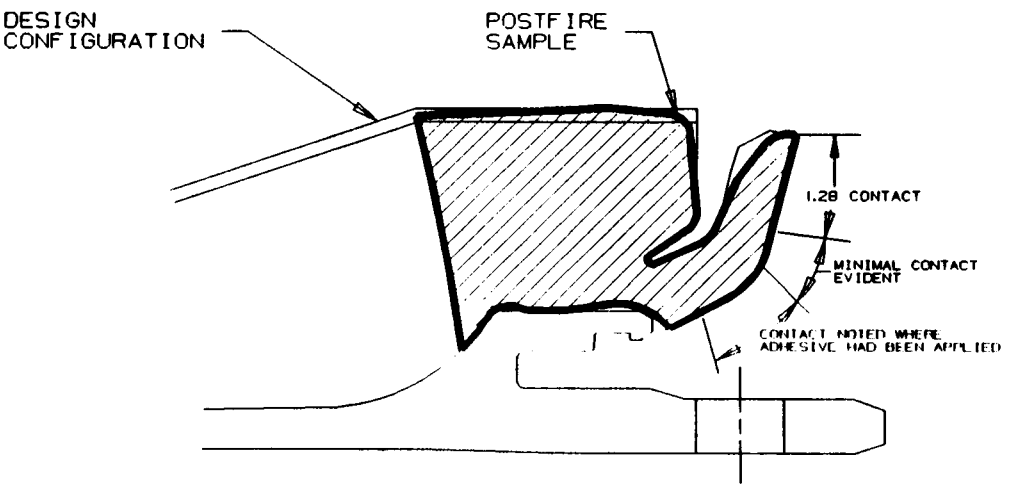
RSRM-1A CENTER FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 3



FWD/CTR CLEVIS
AT 90°



FWD TANG
AT 92°

RSRM-1A FORWARD FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 4

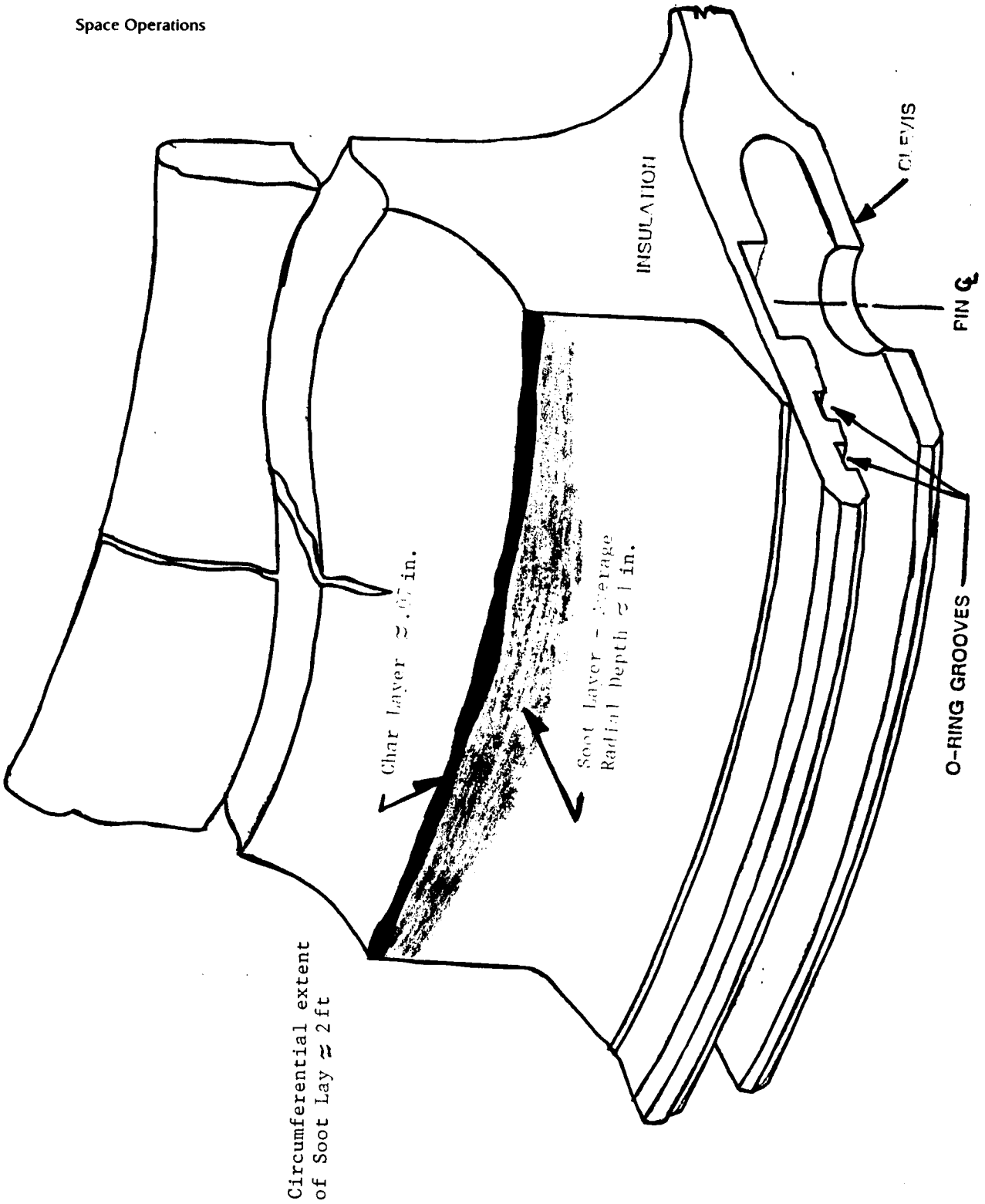


FIGURE 5. FORWARD FIELD JOINT - TYPICAL SOOT DEPOSITS

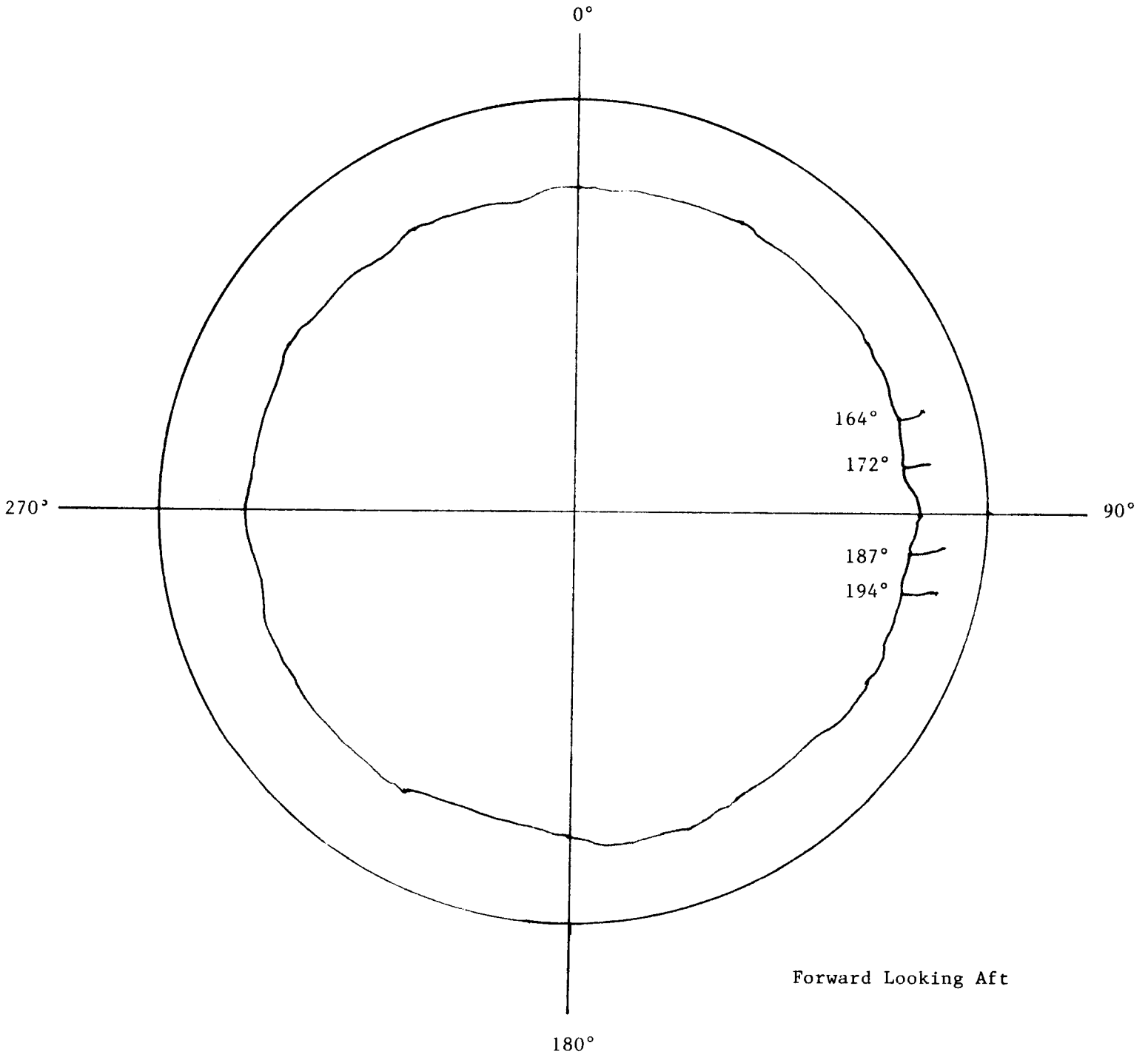
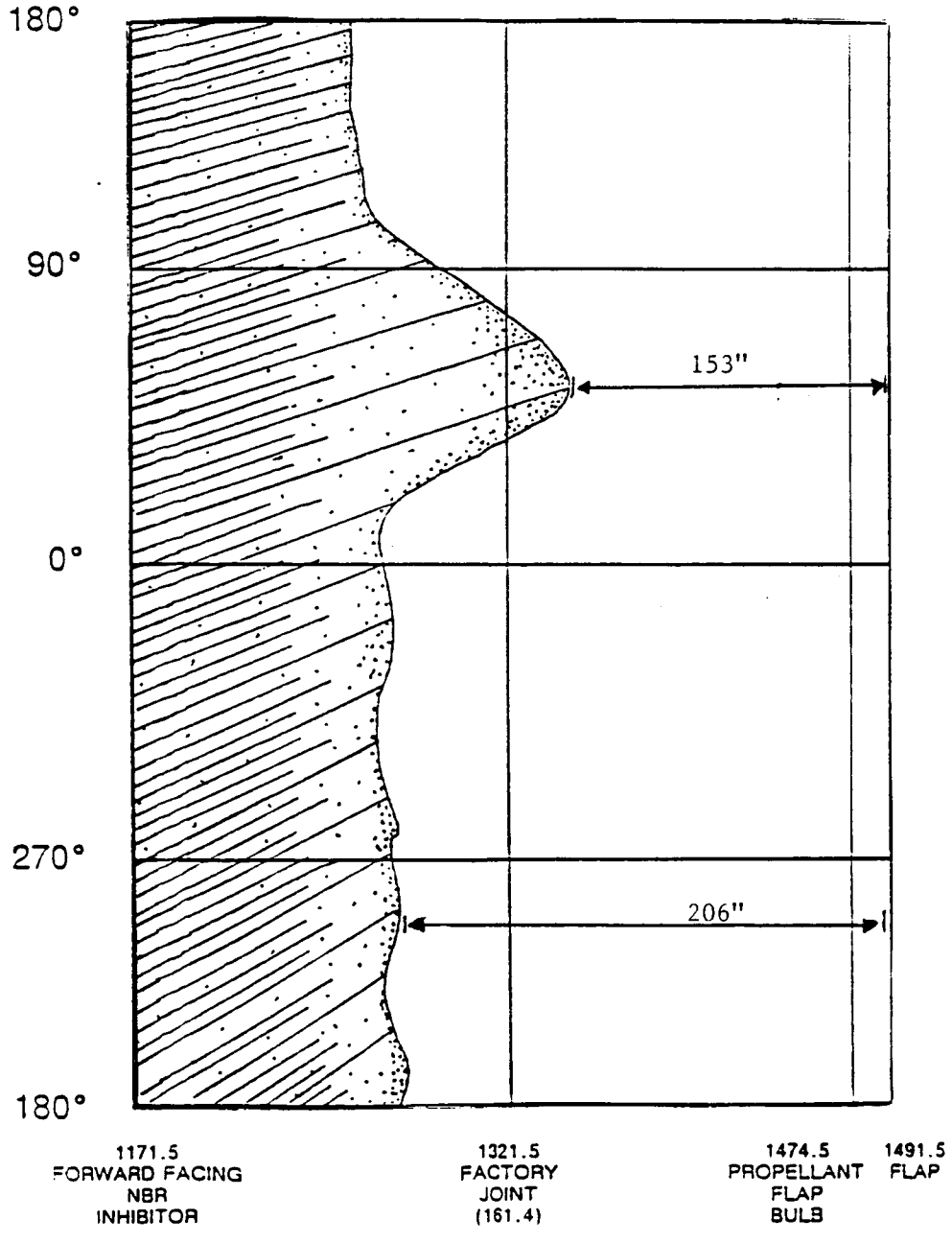
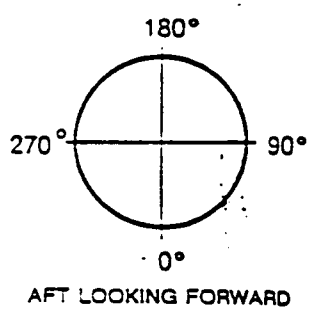


FIGURE 6. RSRM-1A AFT CENTER SEGMENT INHIBITOR TEARS





RSRM-1A Aft Center Segment Liner Pattern
FIGURE 7

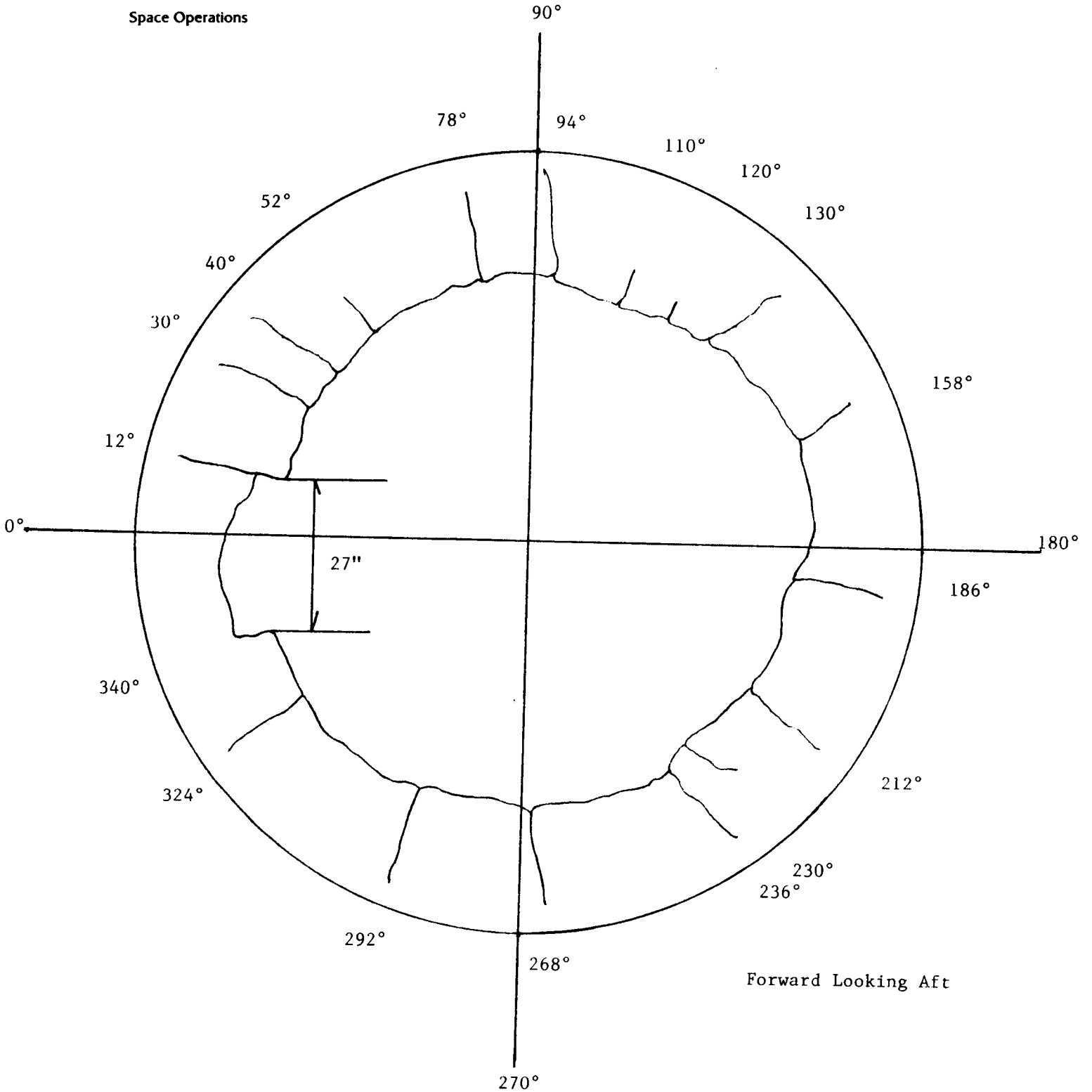
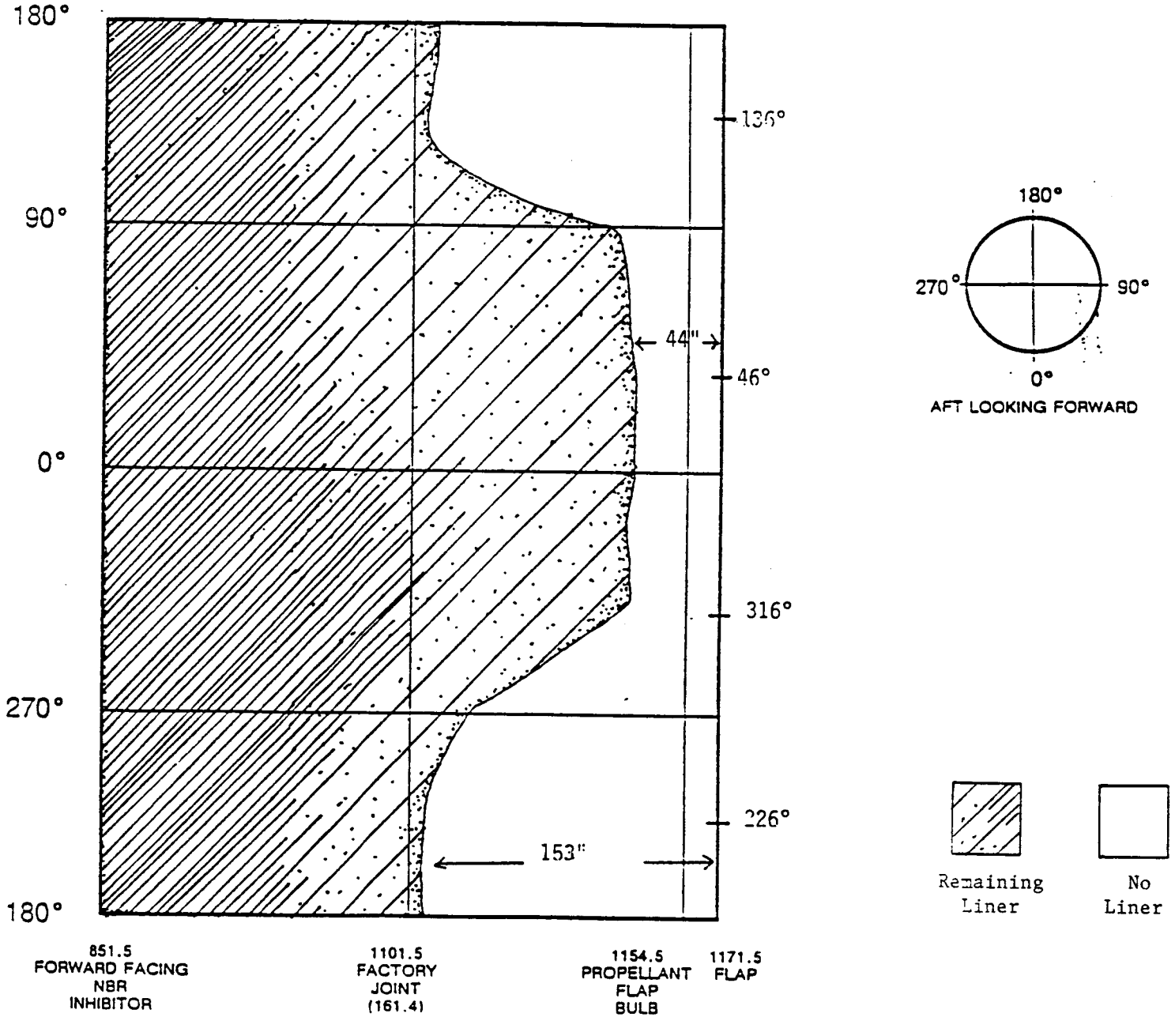
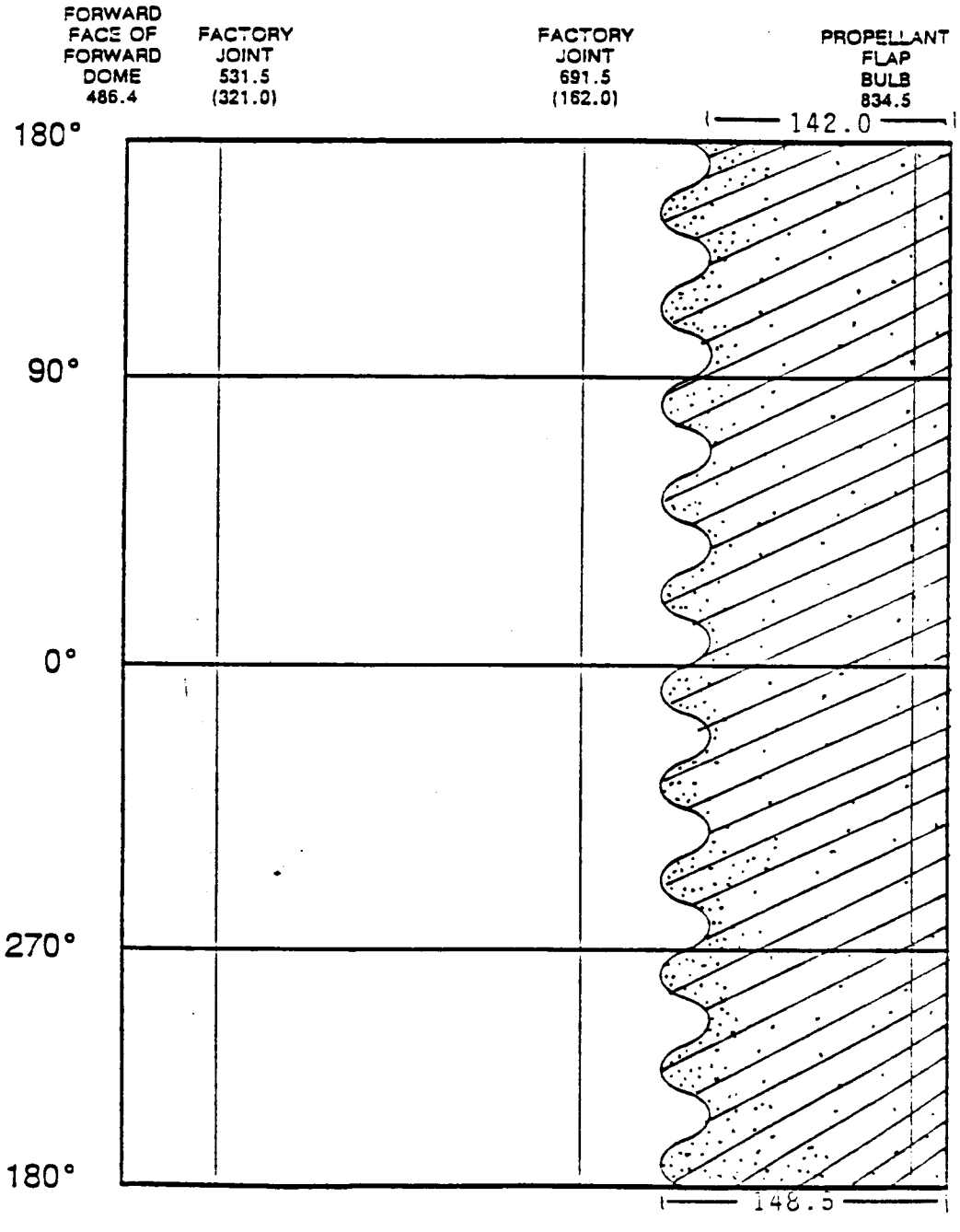
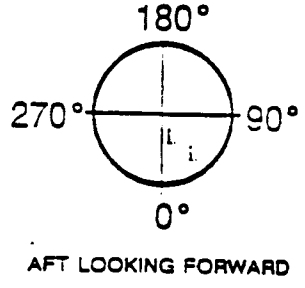


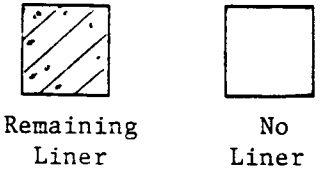
FIGURE 8 . RSRM-1A FORWARD CENTER SEGMENT INHIBITOR TEARS



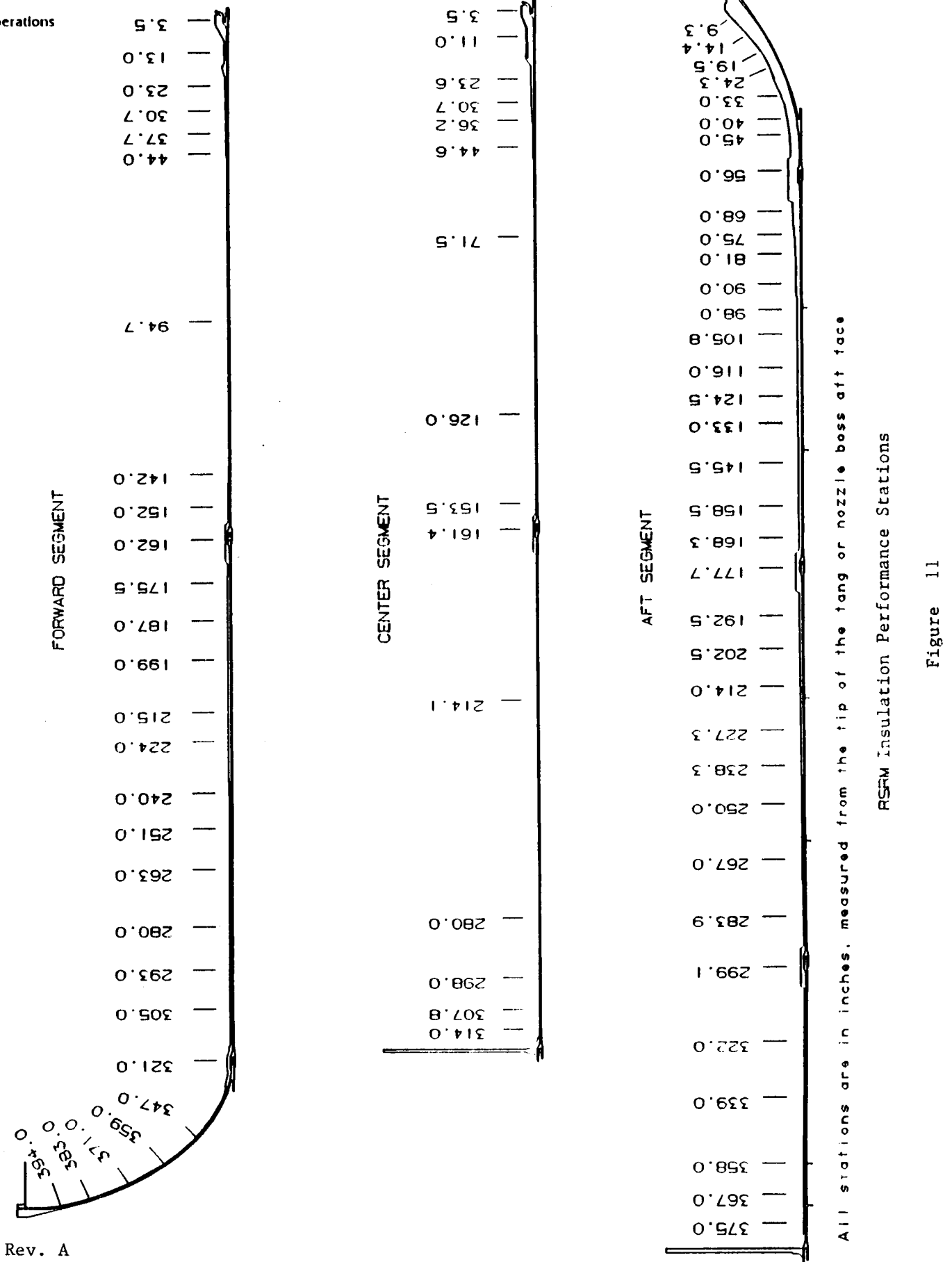
RSRM-1A Forward Center Segment Liner Pattern
FIGURE 9







RSRM-1A Forward Segment Liner Pattern
FIGURE 10



All stations are in inches, measured from the tip of the tang or nozzle boss aft face

RSRM Insulation Performance Stations

Figure 11

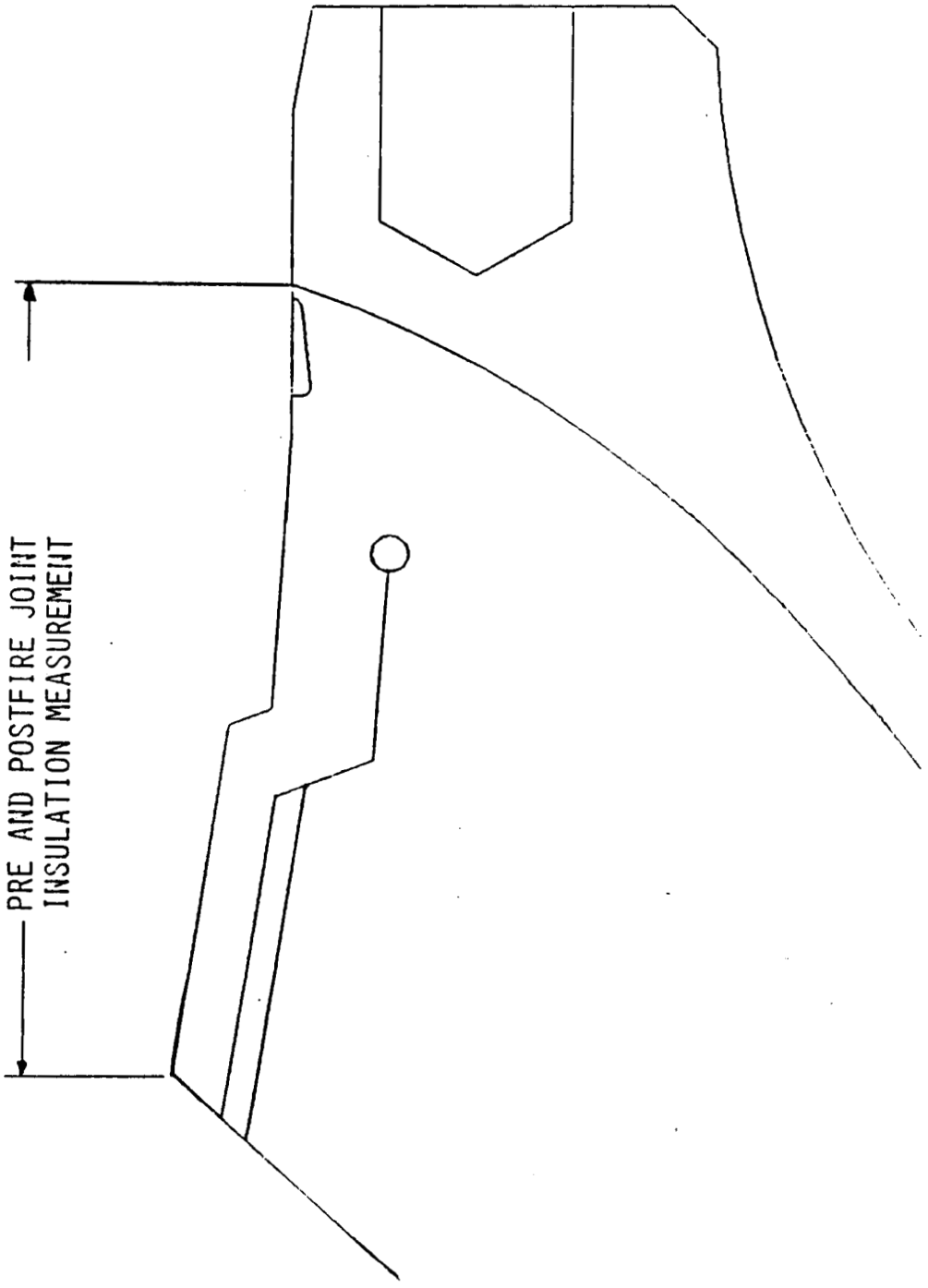


Figure 12
Nozzle to Case Joint Safety Factor Measurement

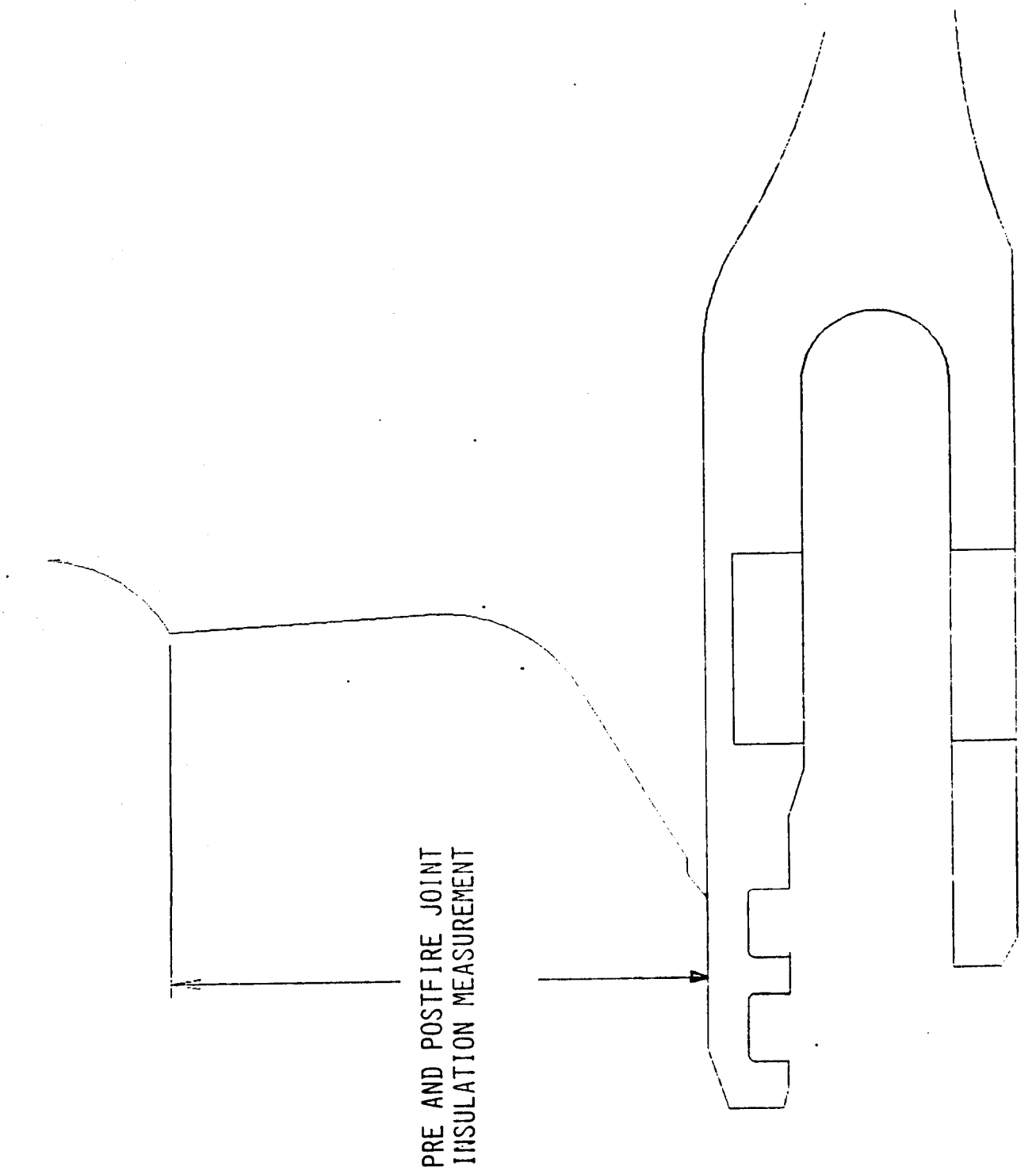
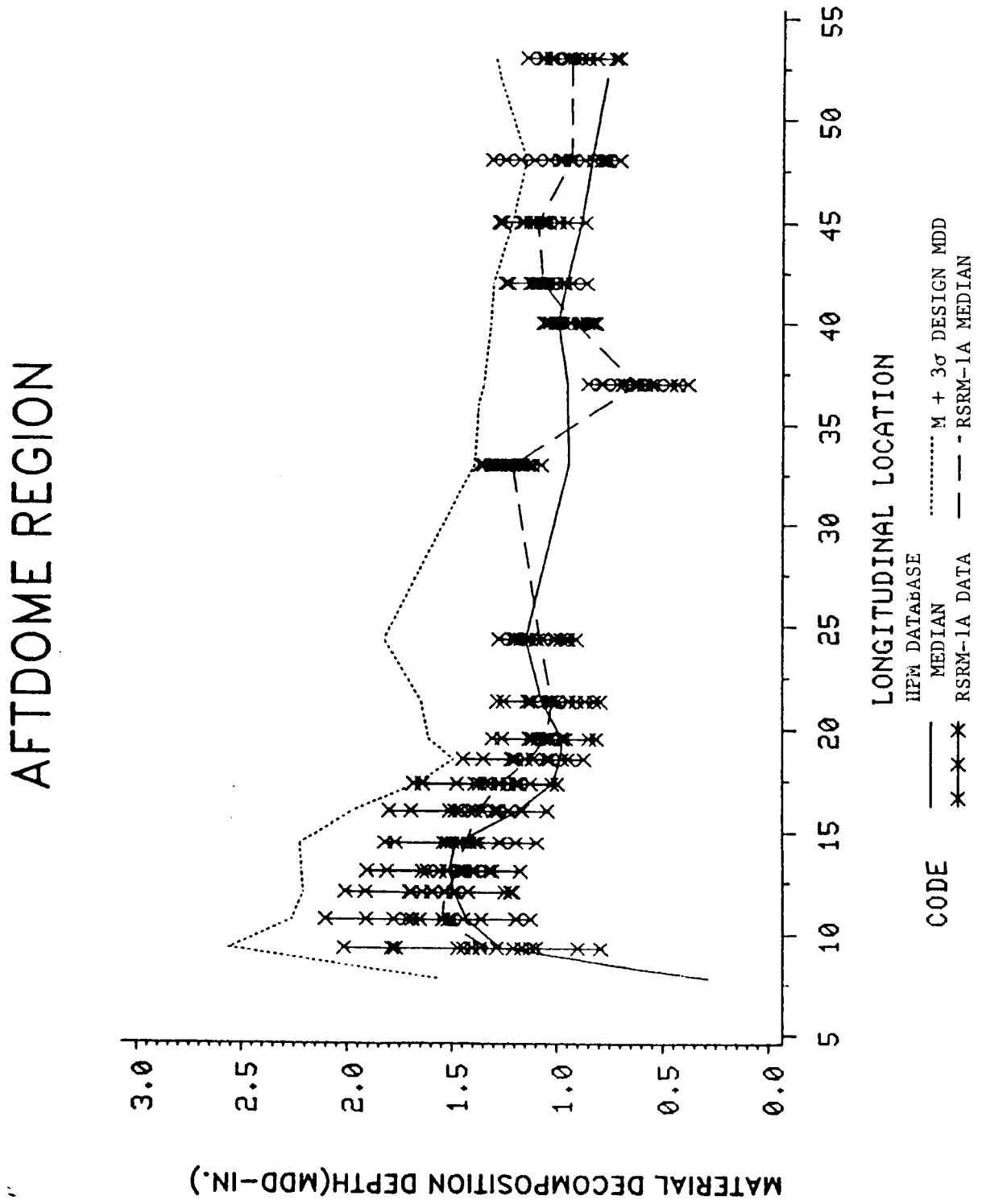
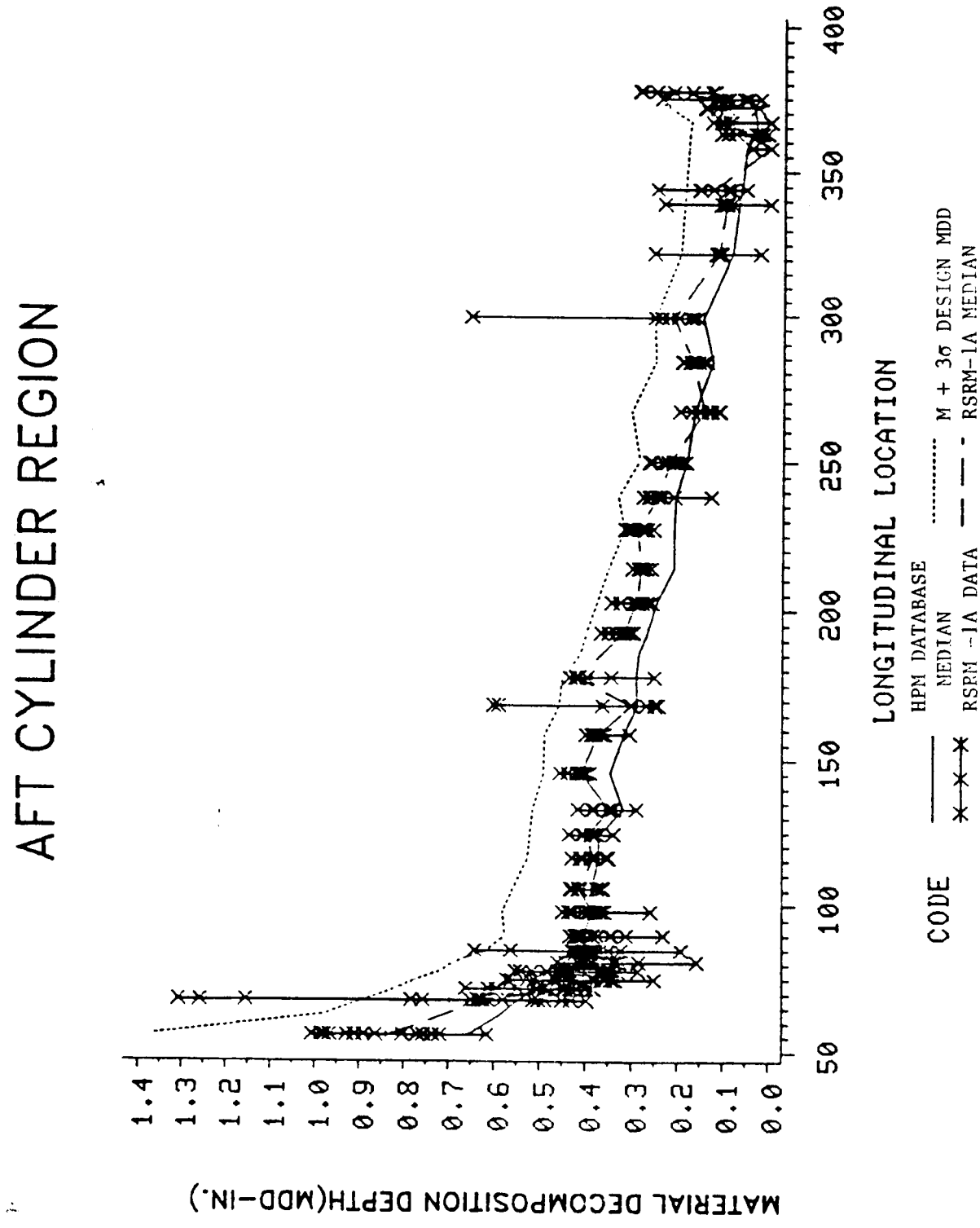


Figure 13
Field Joint (Clevis) Safety Factor Measurement



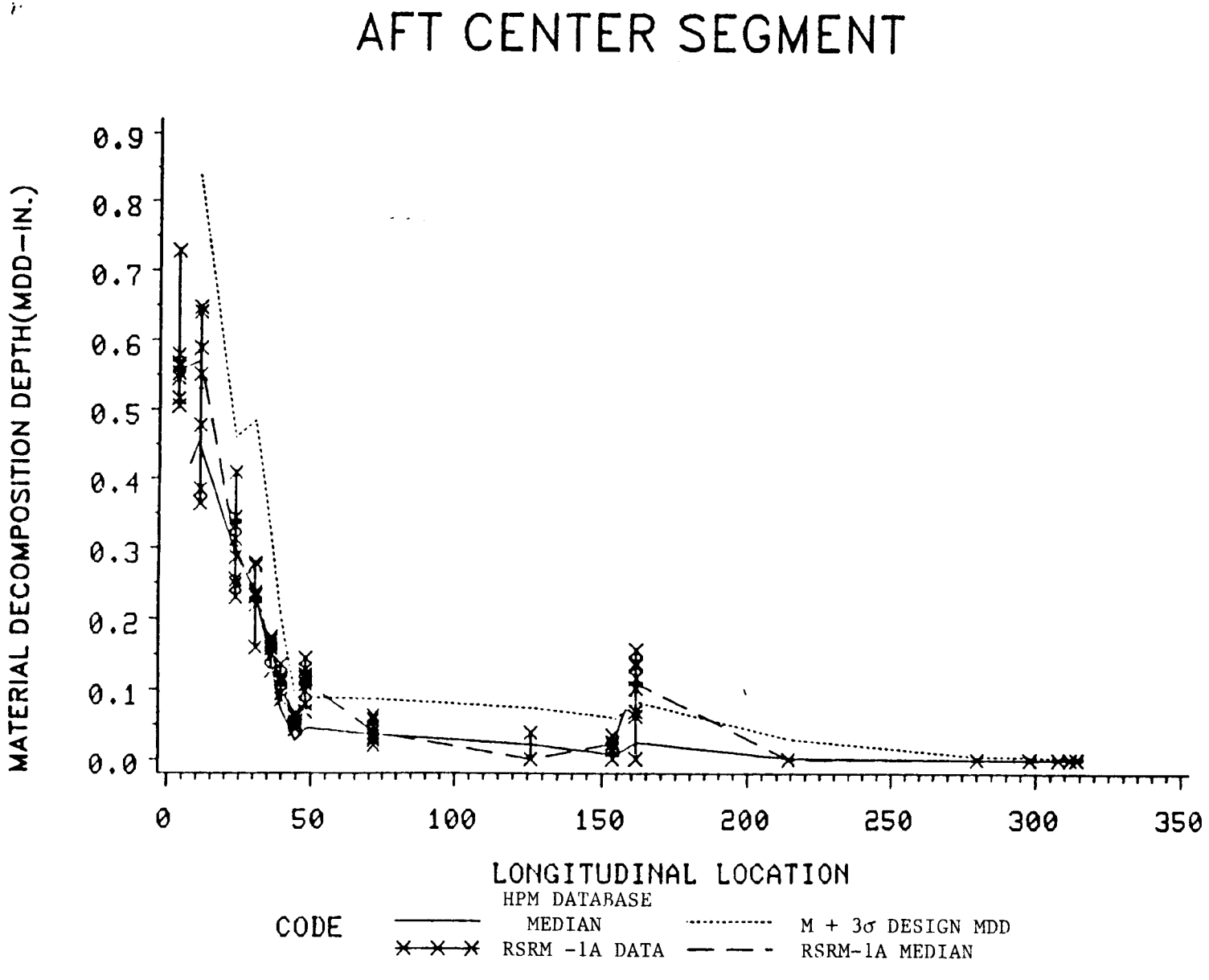
RSRM-1A Aft Dome Insulation Performance

FIGURE 14



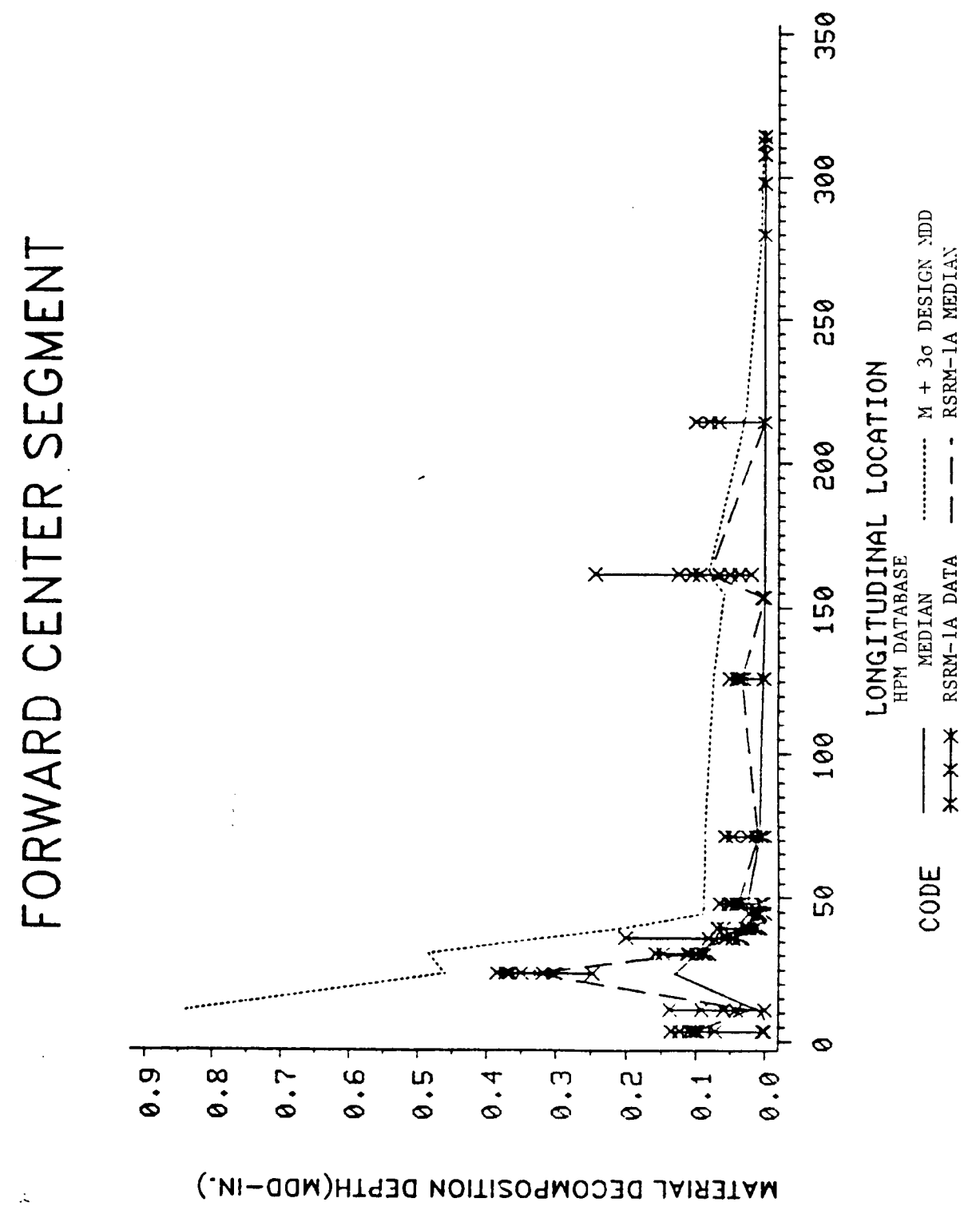
RSRM-1A Aft Cylinder Insulation Performance

FIGURE 15



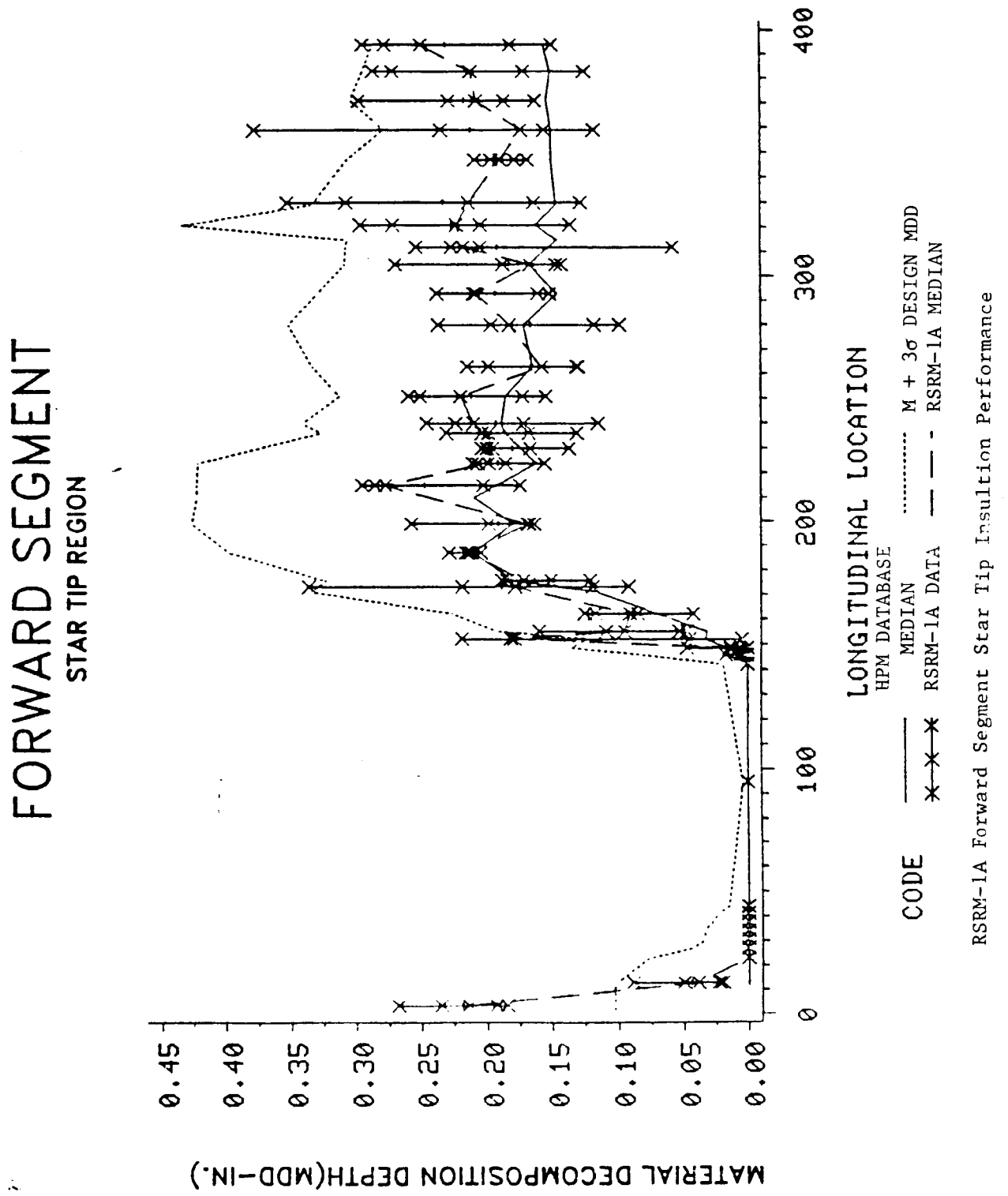
RSRM-1A Aft Center Segment Insulation Performance

FIGURE 16



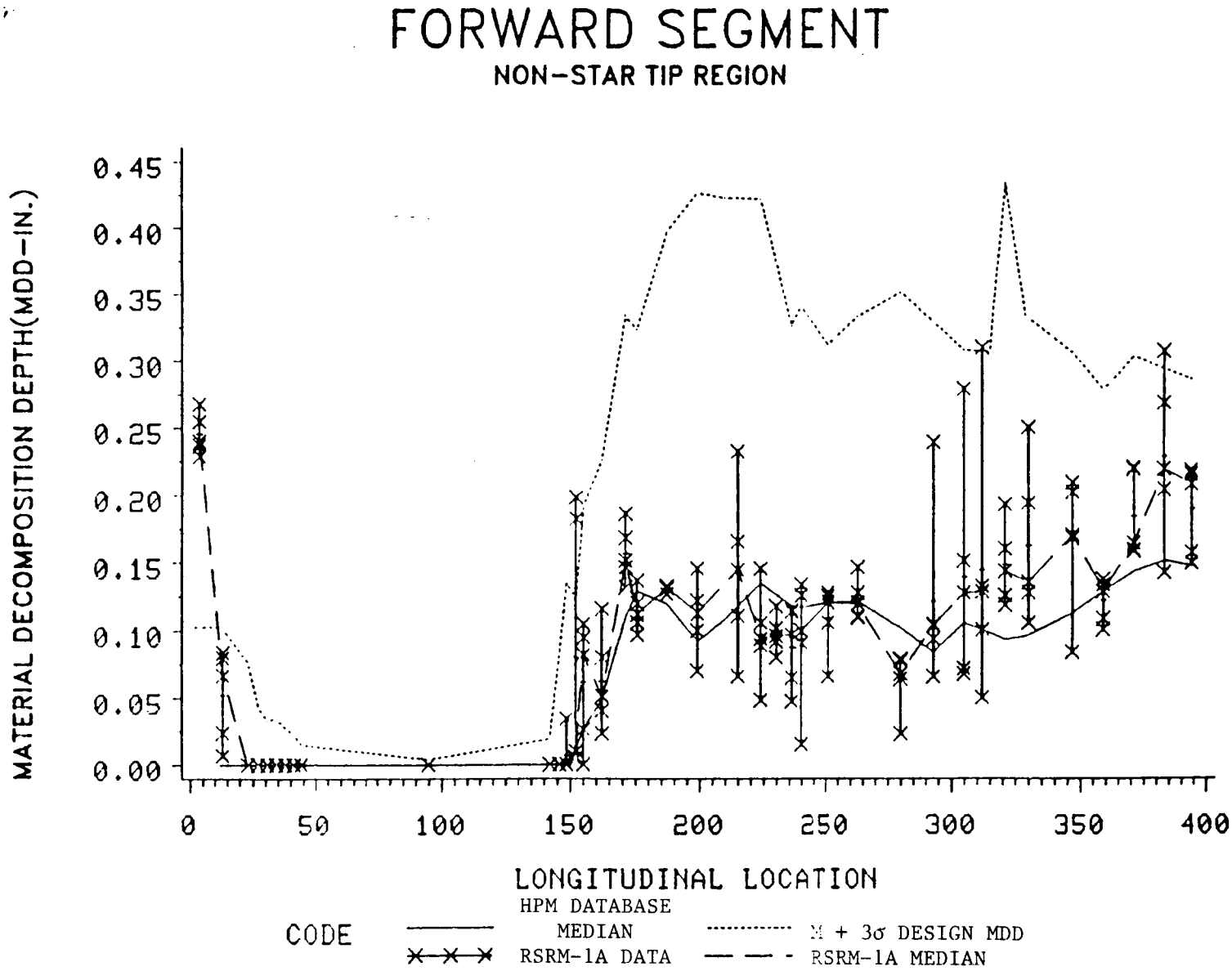
RSRM-1A Forward Center Segment Insulation Performance

FIGURE 17



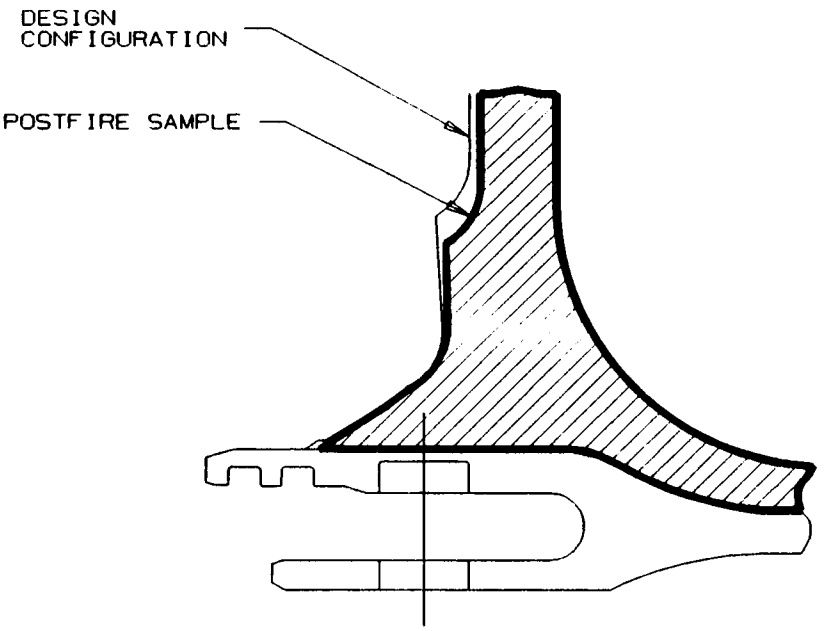
RSRM-1A Forward Segment Star Tip Insultion Performance

FIGURE 18

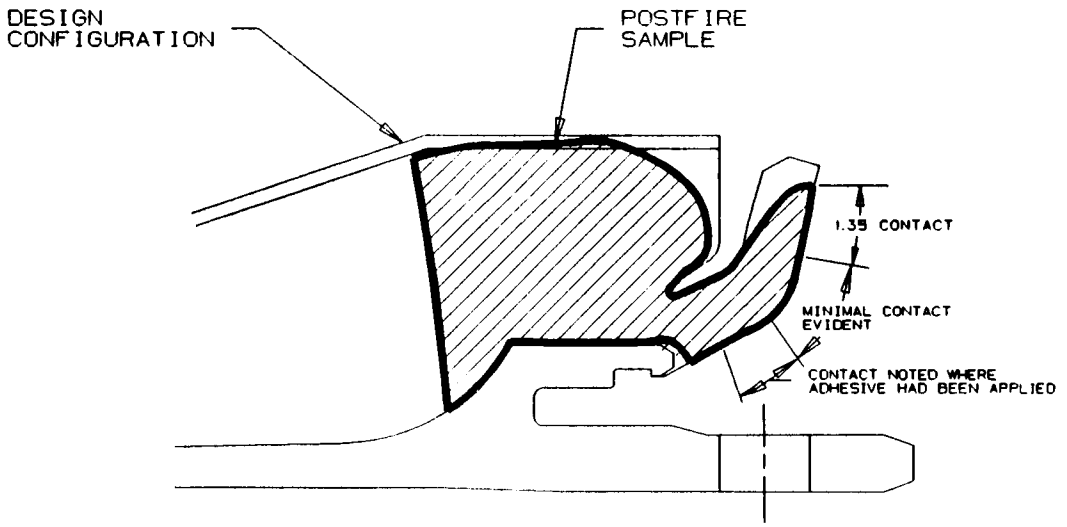


RSRM-1A Forward Segment Non-Star Tip Insulation Performance

FIGURE 19



AFT CLEVIS
AT 260°

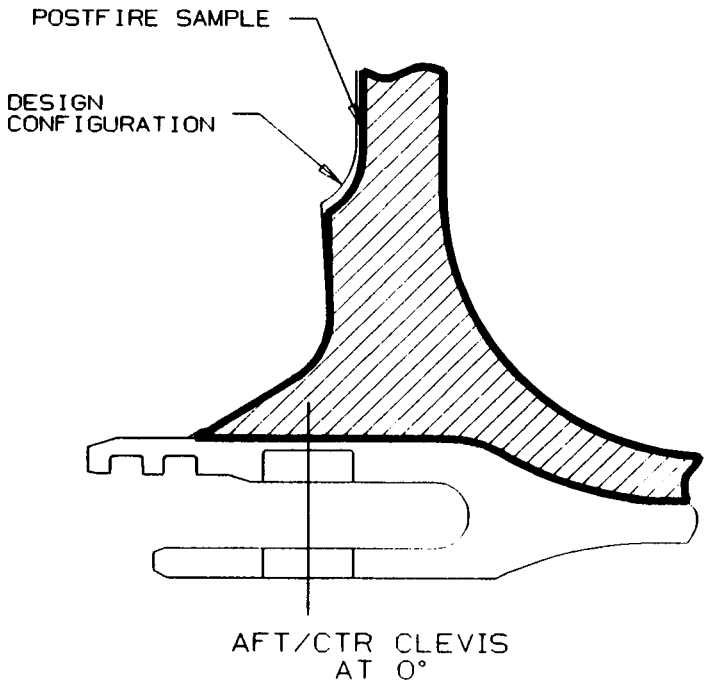


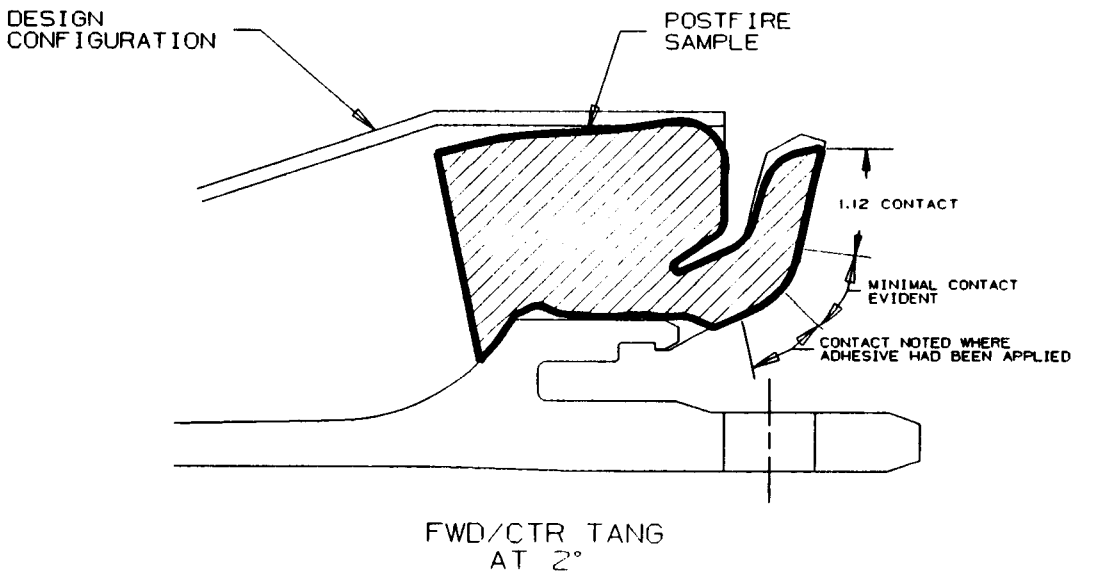
AFT/CTR TANG
AT 260°

RSRM-1B AFT FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 20

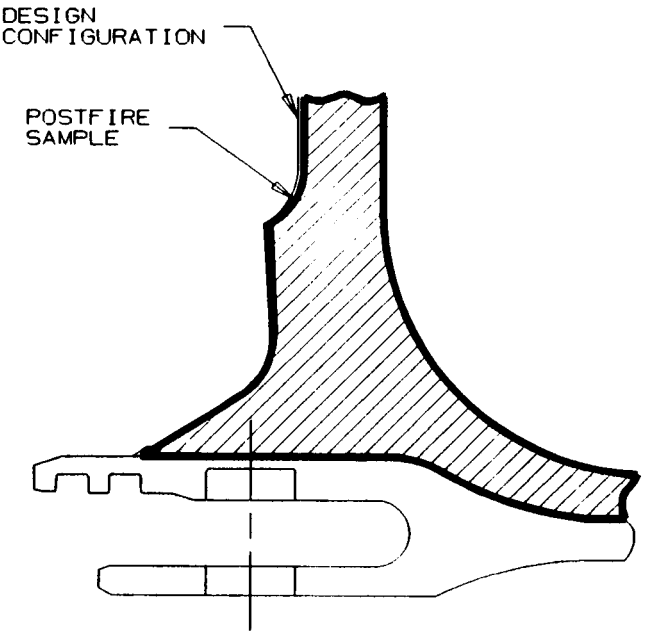




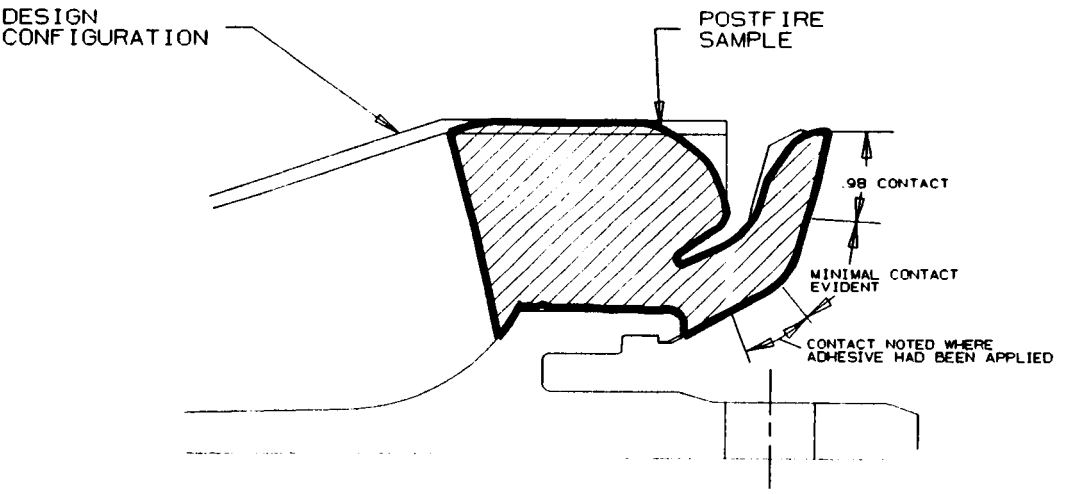
RSRM-1B CENTER FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 21



FWD/CTR CLEVIS
AT 2°

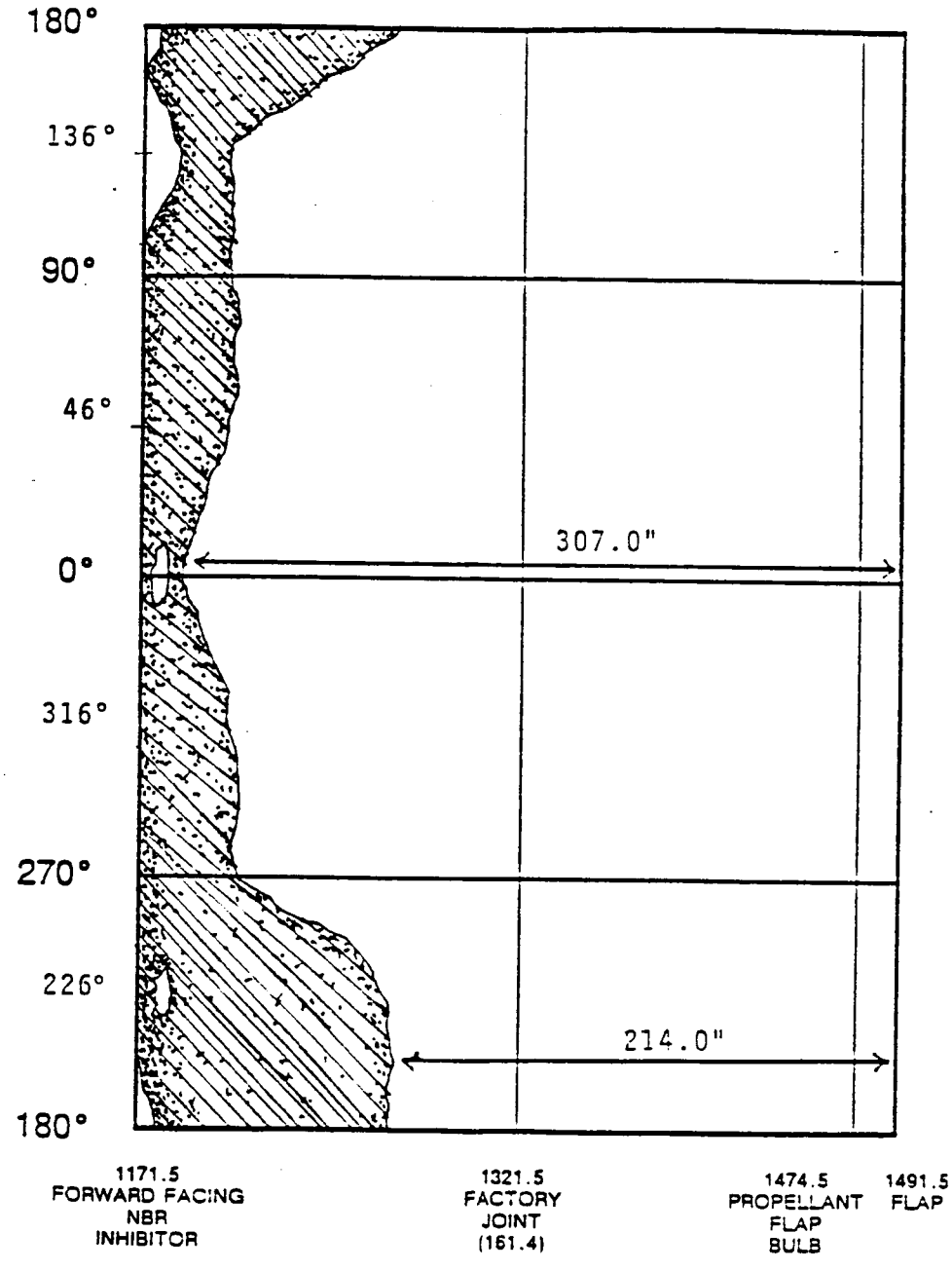


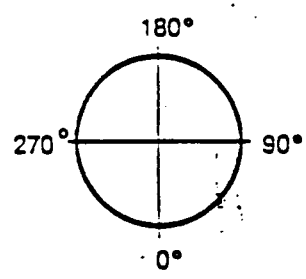
FWD TANG
AT 2°

RSRM-1B FORWARD FIELD JOINT

CLEVIS AND TANG INSULATION
TYPICAL POSTFIRE CONDITION

FIGURE 22





RSRM-1B Aft Center Segment Liner Pattern
FIGURE 23

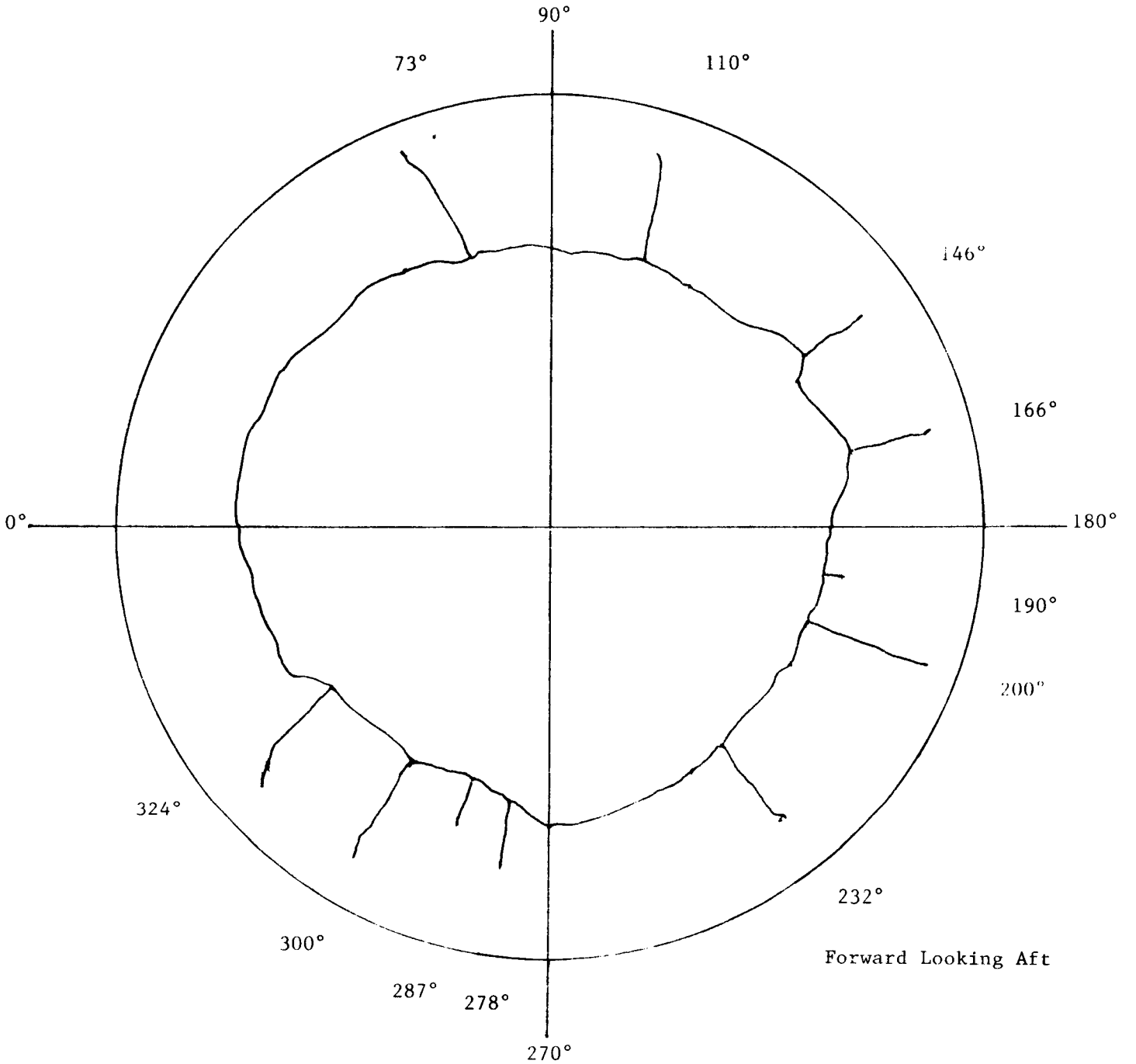
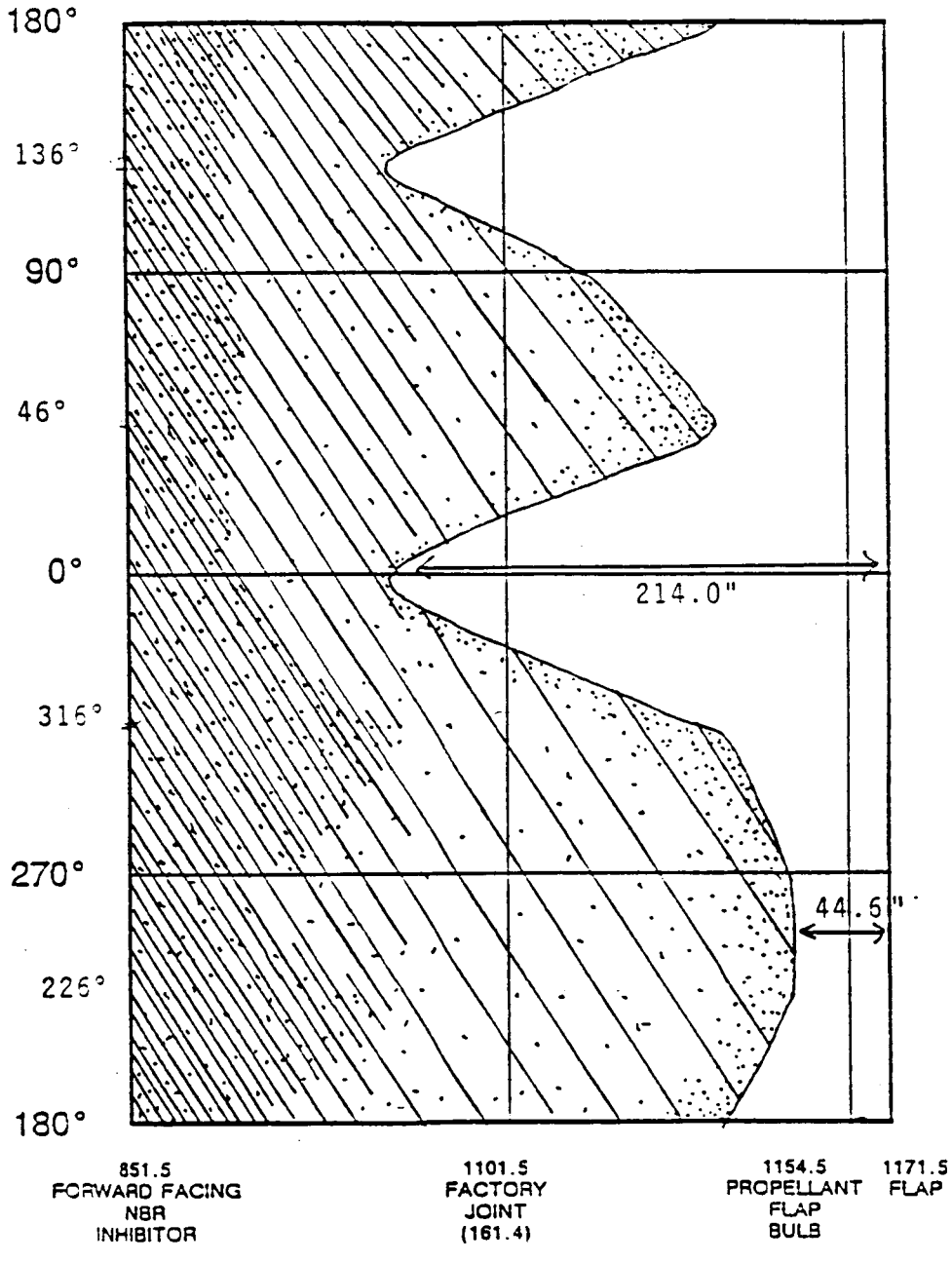
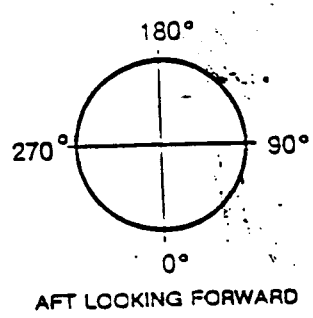
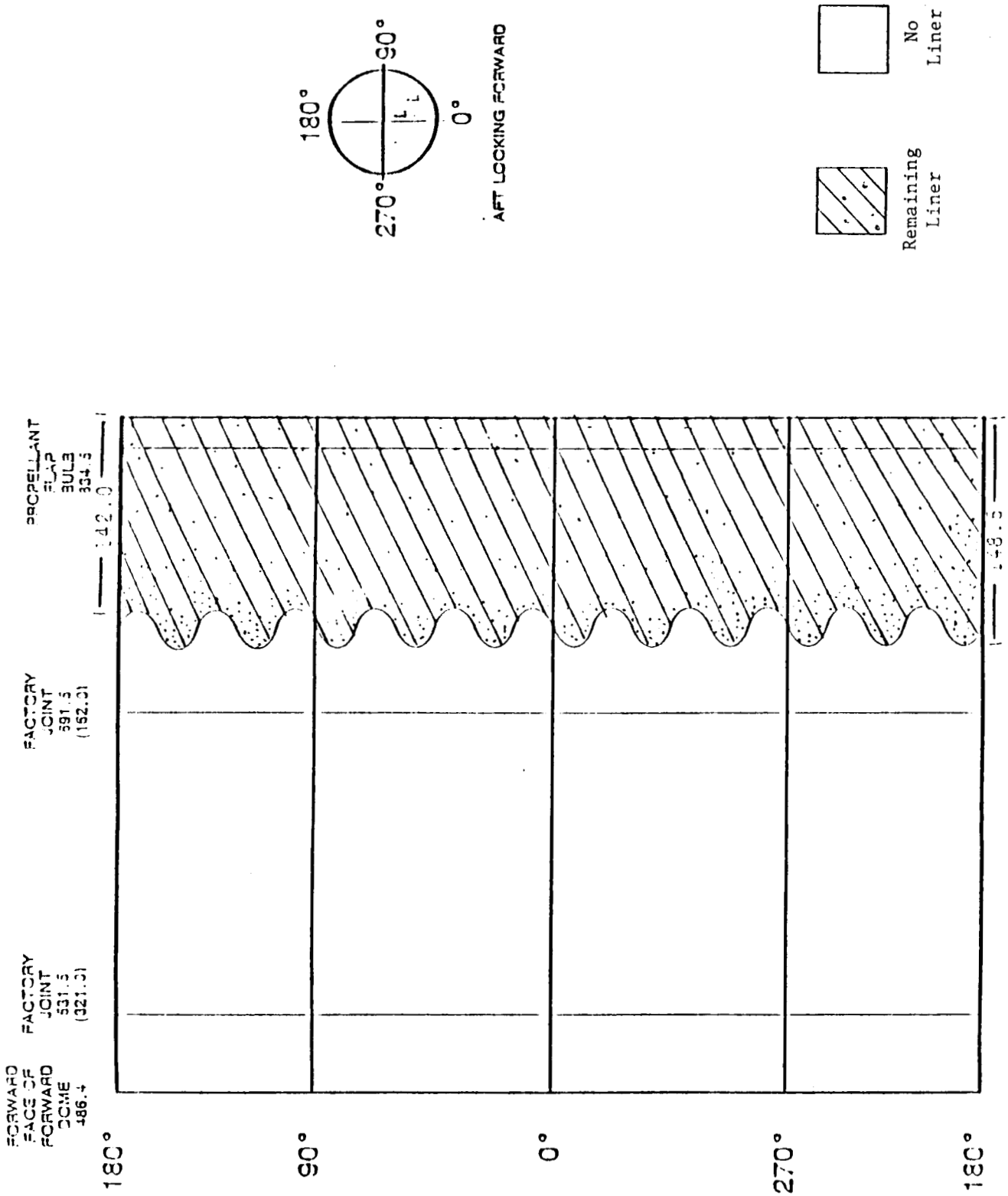


FIGURE 24. RSRM-1B FORWARD CENTER SEGMENT - INHIBITOR TEARS

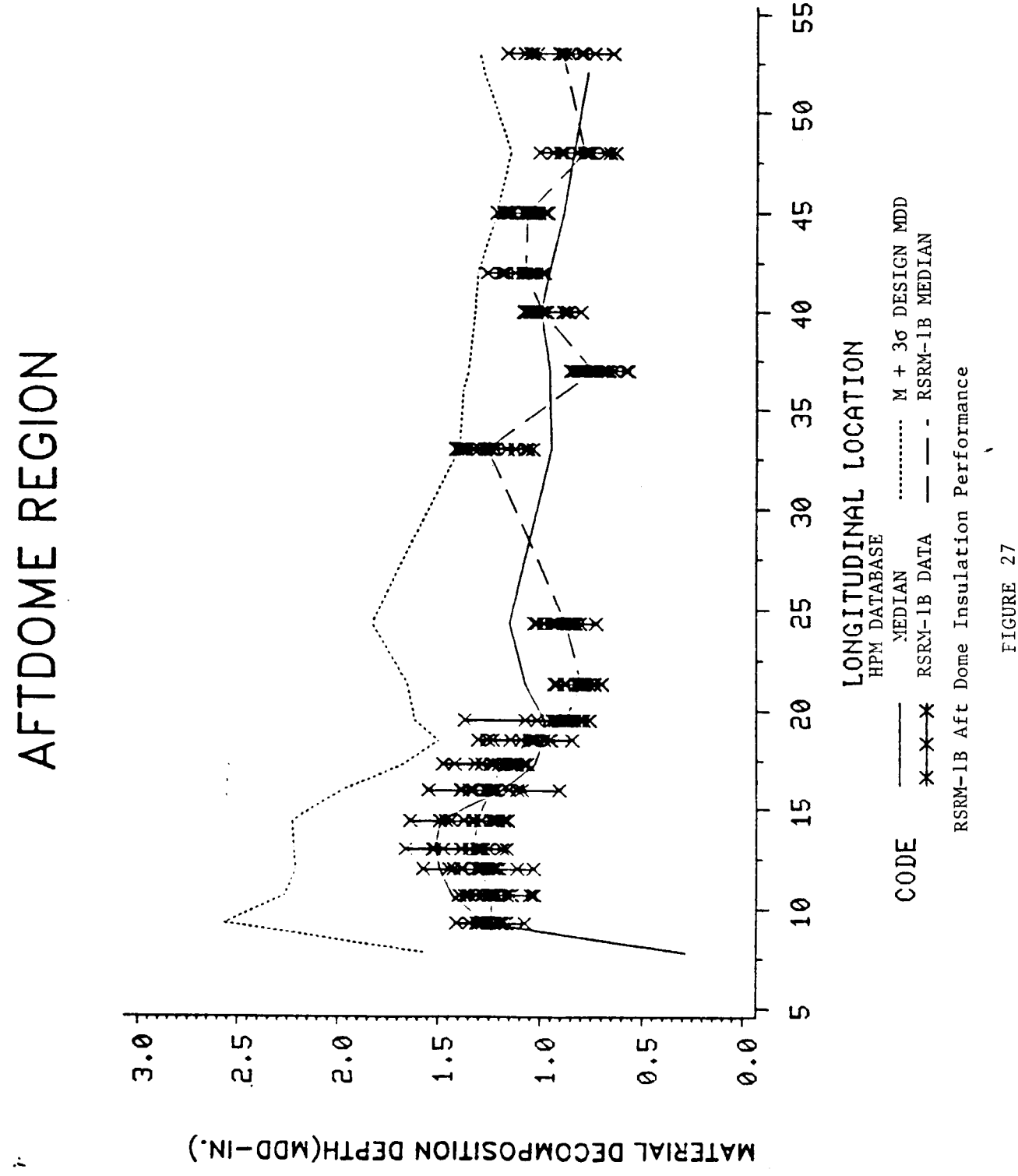




RSRM-1B Forward Center Segment Liner Pattern
FIGURE 25

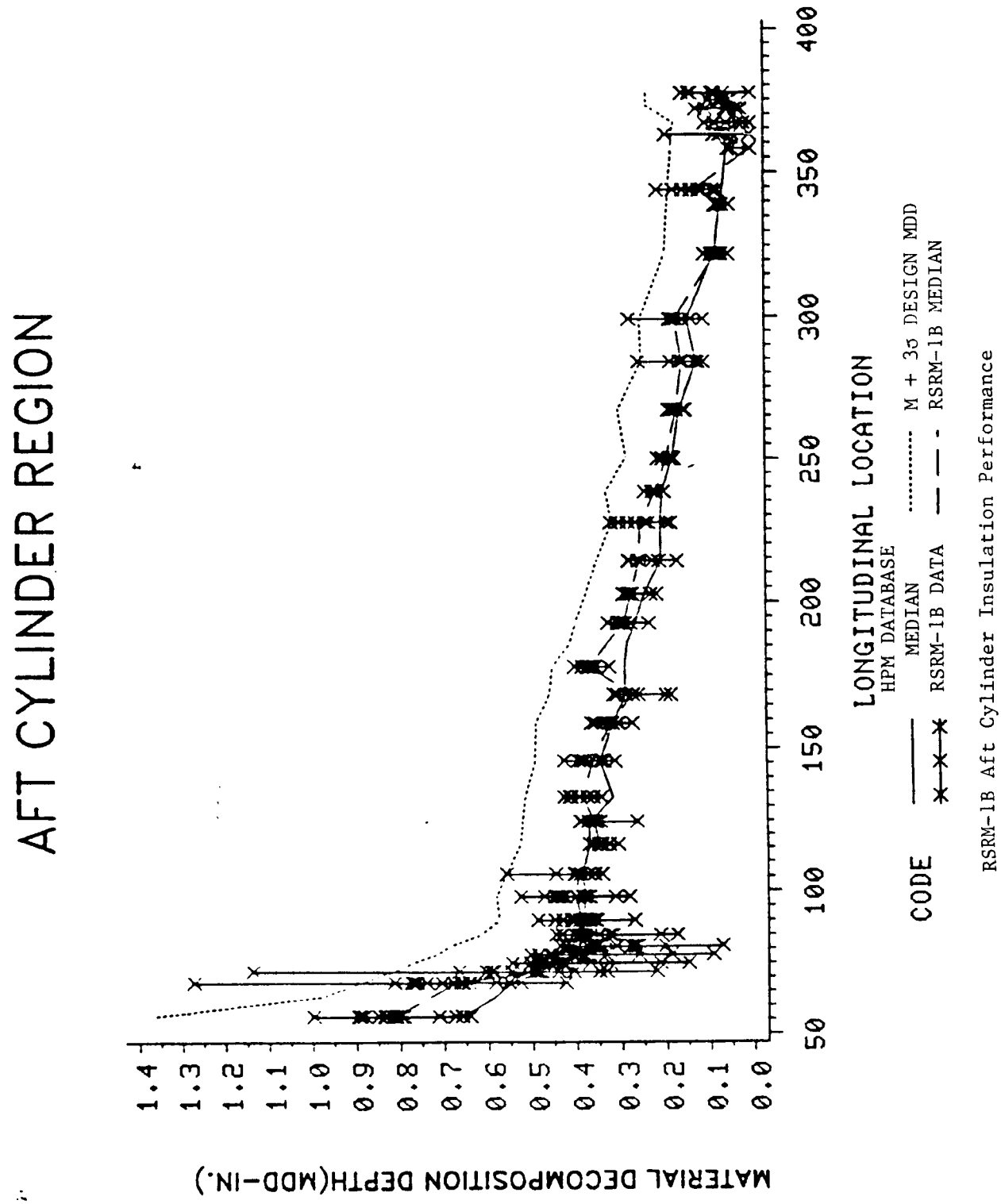


RSRM-1B Forward Segment Liner Pattern
FIGURE 26



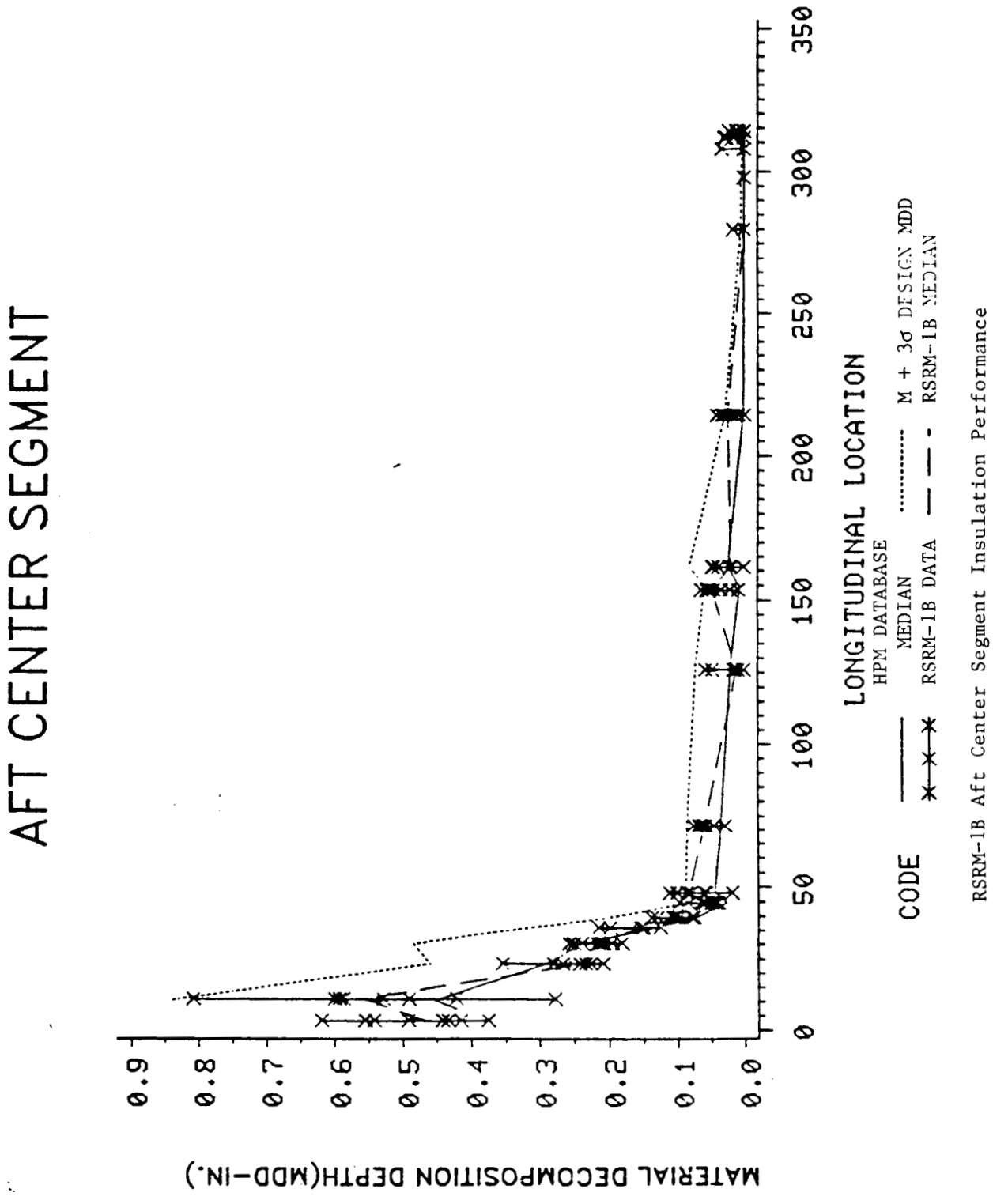
RSRM-1B Aft Dome Insulation Performance

FIGURE 27



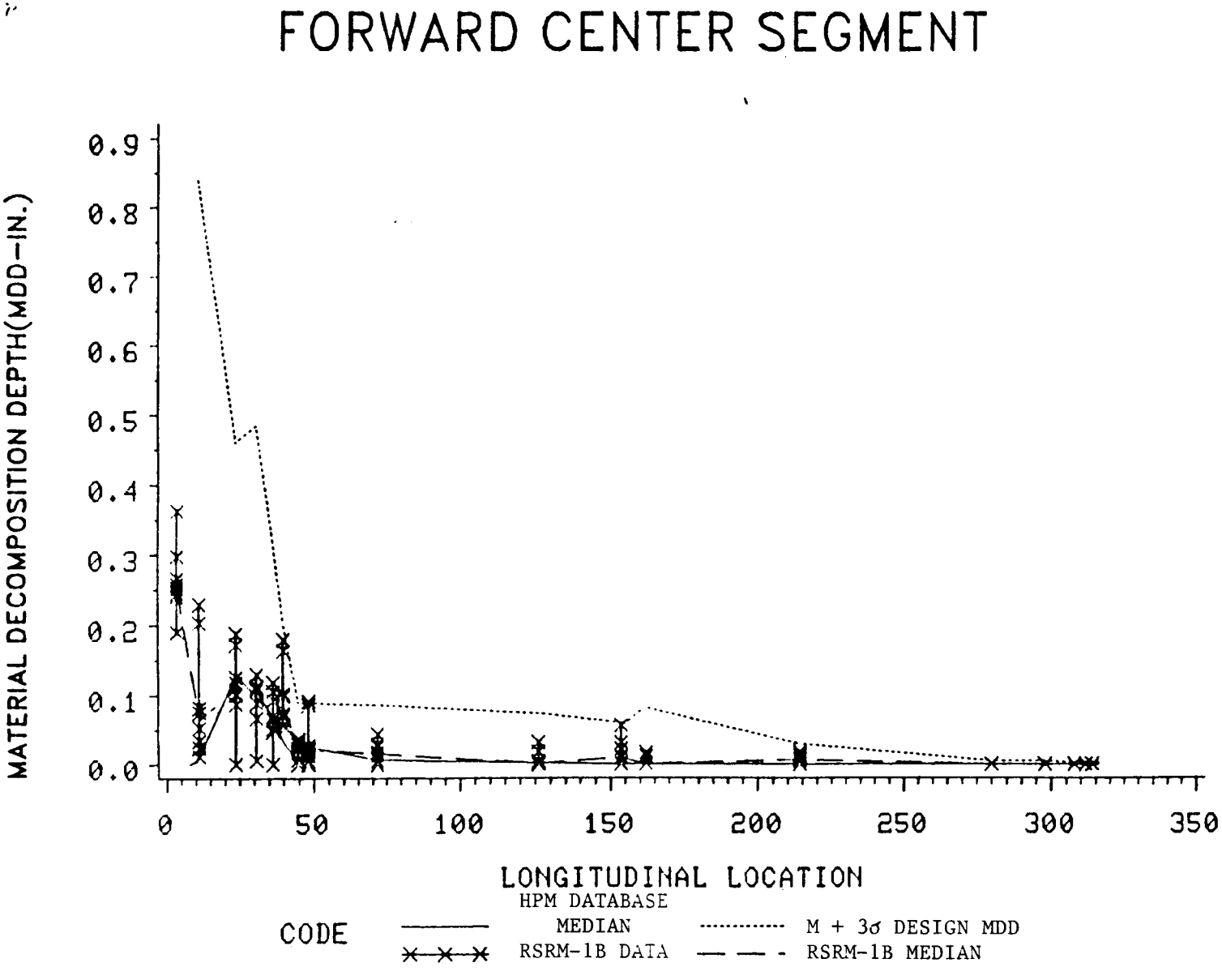
RSRM-1B Aft Cylinder Insulation Performance

FIGURE 28



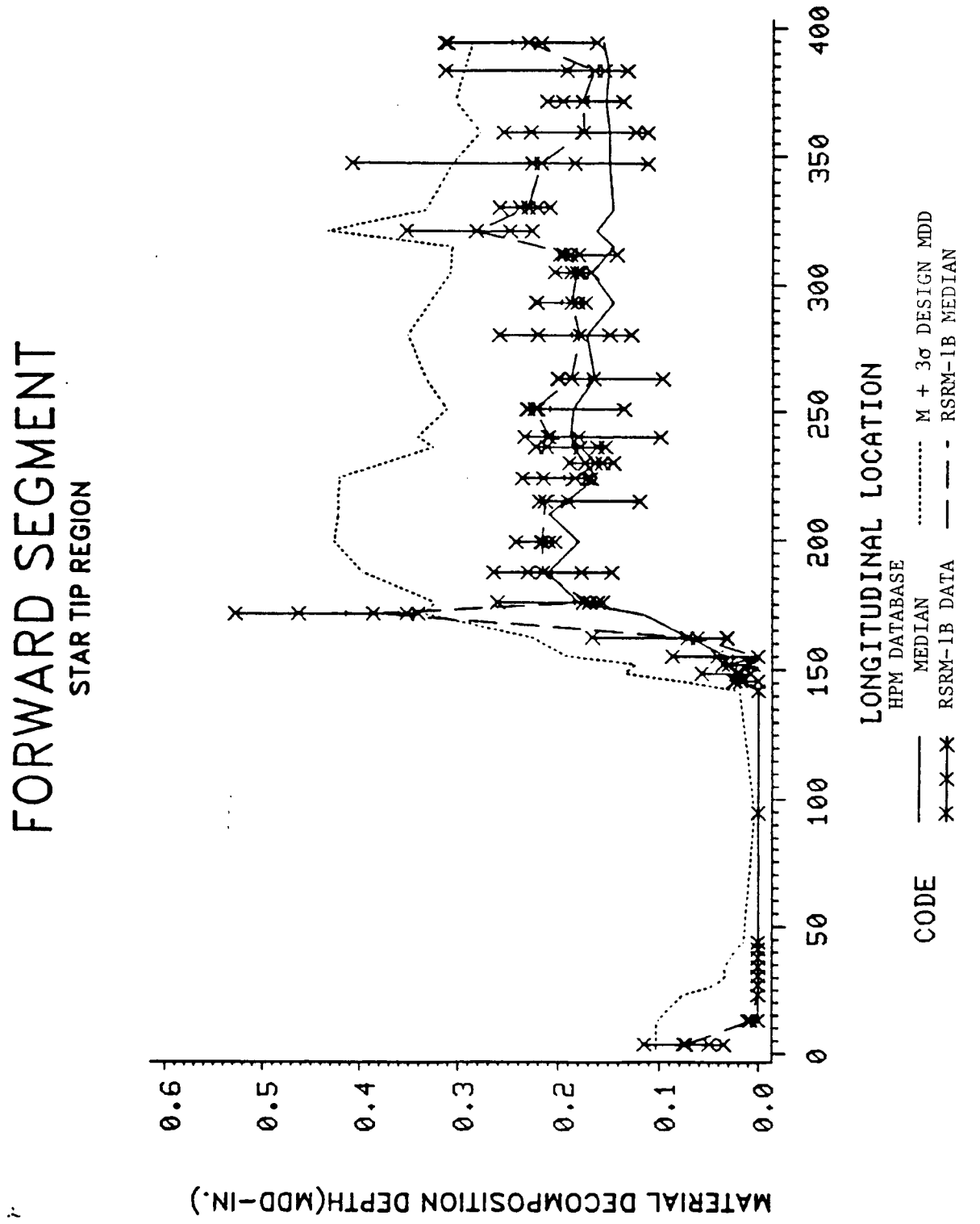
RSRM-1B Aft Center Segment Insulation Performance

FIGURE 29



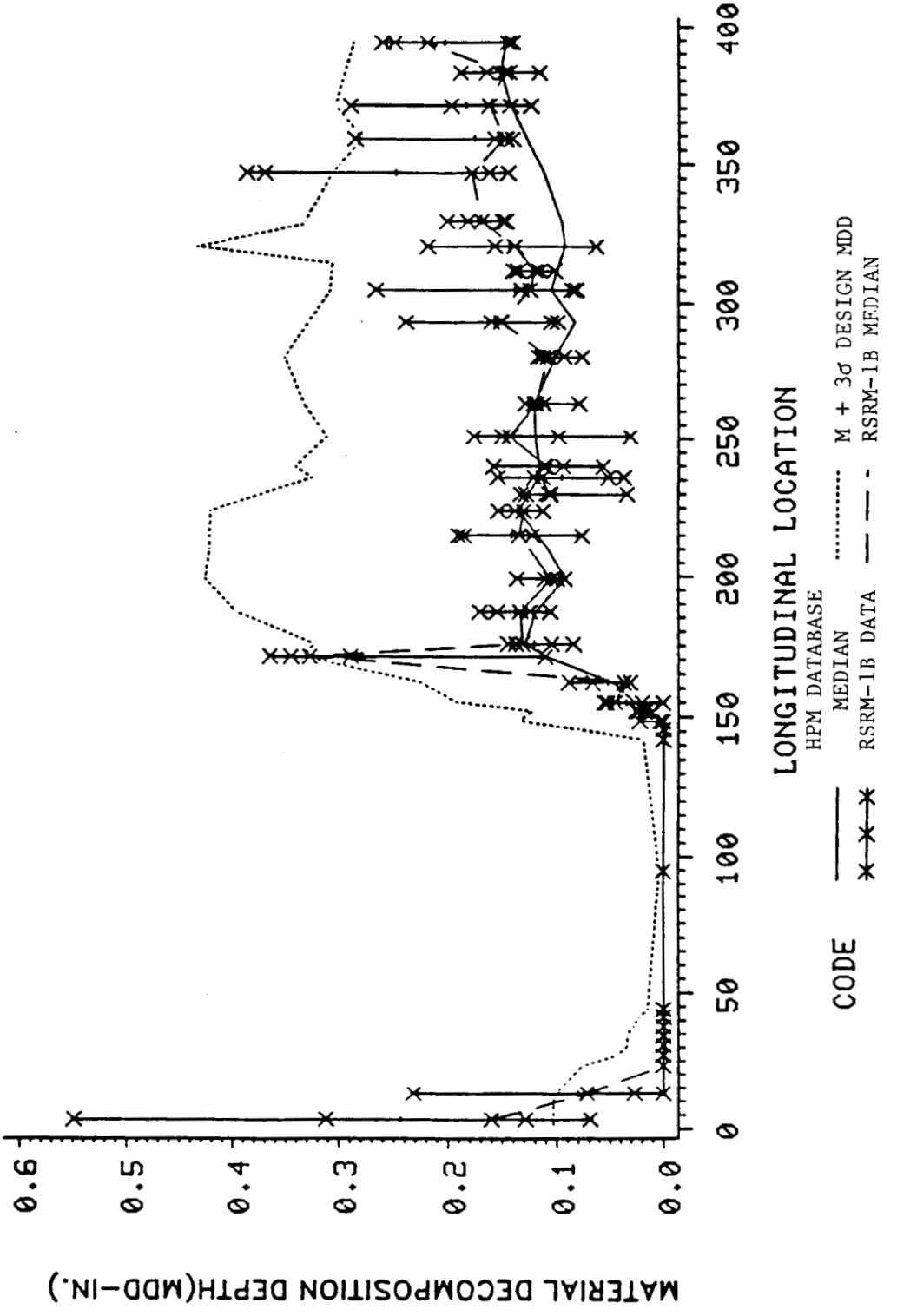
RSRM-1B Forward Center Segment Insulation Performance

FIGURE 30



RSRM-1B Forward Segment Star Tip Insulation Performance

FIGURE 31



RSRM-1B Forward Segment Non-Star Tip Insulation Performance

FIGURE 32

TABLE 1
SUMMARY OF NOZZLE TO CASE JOINT AND FIELD JOINT SAFETY FACTORS

JOINT	MINIMUM COMPLIANCE SAFETY FACTOR (CSF)	DEGREE LOCATION	MINIMUM ACTUAL SAFETY FACTOR (ASF)	DEGREE LOCATION
NOZZLE TO CASE A	3.7	0°	4.1	0°
NOZZLE TO CASE B	6.1	90°	6.9	90°
AFT A	4.7	180°	5.2	180°
AFT B	5.2	50° & 230°	5.5	230°
CENTER A	8.1	80°	8.6	80°
CENTER B	10.7	20°	11.3	20°
FORWARD A	10.5	350°	11.3	350°
FORWARD B	16.4	180°	17.3	180°

NOTE: ALL SAFETY FACTORS MUST MEET A 2.0 MINIMUM.

CSF = MDT/MDD
ASF = Actual Prefire Thickness/MDD

Where: MDT = Minimum Design Thickness
MDD = Material Decomposition Depth

TABLE 2
SUMMARY OF FACTORY JOINT SAFETY FACTORS

SEGMENT	STATION	MINIMUM COMPLIANCE SAFETY FACTOR (CSF)	DEGREE LOCATION	MINIMUM ACTUAL SAFETY FACTOR (ASF)	DEGREE LOCATION
AFT A	56.0"	2.77	68.4°	3.55	158.4°
AFT B	56.0"	2.80	90°	3.51	90°
AFT A	177.7"	2.29	90°	3.43	90°
AFT B	177.7"	2.49	180°	3.76	180°
AFT A	299.1"	1.02*	0°	2.35	0°
AFT B	299.1"	2.40	316.8°	4.18	316.8°
AFT CTR A	161.4"	1.51**	46°	4.12	46°
AFT CTR B	161.4"	4.92	226°	11.42	226°
FWD CTR A	161.4"	0.97***	0°	3.13	0°
FWD CTR B	161.4"	13.88	136°	30.06	136°
FORWARD A	162.0"	4.03	90°	6.18	90°
FORWARD B	162.0"	3.04	222°	4.64	222°
FORWARD A	321.0"	3.09	352°	3.72	352°
FORWARD B	321.0"	2.59	90°	2.61	90°

NOTE: ALL FACTORY JOINT SAFETY FACTORS MUST MEET A 2.0 MINIMUM
* SEE SECTION 7.3.2
** SEE SECTION 7.4
*** SEE SECTION 7.5

CSF = MDT/MDD
ASF = Actual Prefire Thickness/MDD

Where: MDT = Minimum Design Thickness
MDD = Material Decomposition Depth

TABLE 3
SUMMARY OF CASE INSULATION SAFETY FACTORS

SEGMENT	MINIMUM COMPLIANCE SAFETY FACTOR (CSF)	STATION	MINIMUM ACTUAL SAFETY FACTOR (ASF)	STATION
AFT DOME A	1.97	48.0"	2.37	45.0"
AFT DOME B	2.05	42.0"	2.39	42.0"
AFT A	1.41*	168.3"	2.10	250.0"
AFT B	1.73	68.0"	2.20	145.5"
AFT CTR A	1.99	48.0"	2.81	48.0"
AFT CTR B	2.03	153.5"	2.46	71.5"
FWD CTR A	1.29**	214.1"	2.44	214.1"
FWD CTR B	2.32	153.5"	3.23	39.7"
FORWARD A	1.38***	359.0"	1.88	359.0"
FORWARD B	1.03****	171.1"	1.85	347.0"

NOTE: ALL ACREAGE AREA SAFETY FACTORS MUST MEET A MINIMUM OF 1.5.
* SEE SECTION 7.3.2
** SEE SECTION 7.5
*** SEE SECTION 7.6.1
**** SEE SECTION 9.6.1

CSF = MDT/MDD
ASF = Actual Prefire Thickness/MDD

Where: MDT = Minimum Design Thickness
MDD = Material Decomposition Depth

Remains Observation	Anomaly		
	Minor	Major	Critical
• Requires no specific action	• Requires corrective action, but has no impact on: —Motor Performance —Program Schedule • Does not reduce usability of part for its intended function • Could cause damage preventing reuse of hardware in combination with other anomaly • Significant departure from the historical data base	• Could cause failure in combination with other anomaly • Could cause damage preventing reuse of hardware • Program acceptance of cause, corrective action, and risk assessment required before subsequent static test/flight	• Violates CEI spec requirements • Could cause failure and possible loss of mission/life • Mandatory resolution before subsequent static test/flight

Note: This criteria is to be applied to the specific observed potential anomaly as it relates to the observed article and as it relates to subsequent articles

CRITERIA FOR CLASSIFYING POTENTIAL ANOMALIES

TABLE 4

A017784a

TABLE 5
RSRM-1 FINAL CLEVIS EDGE SEPARATION CONDITIONS

PREFIRE KSC WORST CONDITIONS

SEGMENT		PREFIRE MAX DEPTH	POSTFIRE MAX DEPTH	DEGREE LOCATION	PRIMARY BOND GROWTH	REPAIR GROWTH	HARD PROBED PREFIRE
A	AFT	0.50	0.00	291	0.00	NO	YES
A	A/C	0.25	0.00	304	0.00	NO	YES
A	F/C	0.16	0.16	149-157	0.00	YES	YES
B	AFT	1.7	0.00	323	0.00	NO	YES
B	A/C	0.91	0.21	115-122	0.00	YES	YES
B	F/C	0.44	0.00	155-158	0.00	NO	YES

POSTFIRE CLEARFIELD H-7 WORST CONDITIONS

SEGMENT		PREFIRE MAX DEPTH	POSTFIRE MAX DEPTH	DEGREE LOCATION	PRIMARY BOND GROWTH	REPAIR GROWTH	HARD PROBED POSTFIRE
A	AFT	0.35	0.22	257	0.00	YES	YES
A	A/C	0.00,0.06	0.26	44,207	0.26,0.20	NO,NO	NO
A	F/C	0.12	0.24	70	0.12	YES	YES
B	AFT	0.18	0.29	142	0.11	YES	YES
B	A/C	0.00	0.36	6	0.36	NO	NO
B	F/C	0.11	0.31	256	0.20	YES	NO

TABLE 6
RSRM-1 FINAL TANG EDGE SEPARATION CONDITIONS

PREFIRE KSC WORST CONDITIONS[1]

SEGMENT		PREFIRE MAX DEPTH[2]	POSTFIRE MAX DEPTH	DEGREE LOCATION	PRIMARY BOND GROWTH
A	A/C	0.17	0.00	38-41	-0.17
A	F/C[3]	0.00	N/A	N/A	N/A
A	FWD	>0.175 [4]	0.15	312	<-0.02
			0.30	83-92	<0.125
B	A/C	0.07	0.25	117, 178-183	0.18
B	F/C[5]	0.19	0.15	284-286	-0.04
B	FWD	0.13	0.25	306	0.12

POSTFIRE CLEARFIELD H-7 WORST CONDITIONS

SEGMENT		PREFIRE MAX DEPTH[2]	POSTFIRE MAX DEPTH	DEGREE LOCATION	PRIMARY BOND GROWTH
A	A/C	0.00	0.15	46	0.15
A	F/C	0.00	0.15	306	0.15
A	FWD	>0.175	0.30	83-92	<0.125
		0.15	0.30	306-315	0.15
		0.00	0.30	OTHERS	0.30
B	A/C	0.00	0.35	82	0.35
B	F/C	0.00,0.17, 0.165,0.18	0.20	64,86,121, 178-183	0.20,0.03, 0.035,0.02
B	FWD	0.00	0.35	94	0.35

NOTES: 1- No repair was performed on these separations prior to stacking.

2- Data as measured from forward corner of chamfer.

3- Regions with no separations @ 45-90, 180-225, 285-330 were hard probed.

4- Bond growth measurements should not be considered exact since prefire measurements may not be greater than 0.175-0.192 inch (Depth of Chamfer) due to inaccessibility.

5- Separated areas, in addition to regions without separations @ 230-240 and 320-330, were hard probed.

RSRM-1A NOZZLE TO CASE JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
0.0	5.488	4.155	1.333	3.7	4.1
21.6	5.505	4.735	0.770	6.4	7.1
46.8	5.467	4.895	0.572	8.6	9.6
68.4	5.490	4.878	0.612	8.0	9.0
90.0	5.453	4.795	0.658	7.4	8.3
111.6	5.378	4.843	0.535	9.2	10.1
136.8	5.420	4.800	0.620	7.9	8.7
158.4	5.365	4.905	0.460	10.7	11.7
180.0	5.394	4.798	0.596	8.2	9.1
201.6	5.398	5.050	0.348	14.1	15.5
226.8	5.390	4.760	0.630	7.8	8.6
248.4	5.369	4.530	0.839	5.8	6.4
270.0	5.520	4.895	0.625	7.8	8.8
291.6	5.459	4.655	0.804	6.1	6.8
316.8	5.437	4.675	0.762	6.4	7.1
338.4	5.463	4.780	0.683	7.2	8.0
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	5.445	4.797	0.628	3.7	4.1

RSRM-1A Nozzle To Case Joint Performance

Table 7

RSRM-1A AFT FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.738	2.350	0.388	6.7	7.1
10.0	2.748	2.335	0.413	6.3	6.7
20.0	2.747	2.291	0.456	5.7	6.0
30.0	2.732	2.311	0.421	6.2	6.5
40.0	2.726	2.314	0.412	6.3	6.6
50.0	2.707	2.286	0.421	6.2	6.4
60.0	2.710	2.234	0.476	5.5	5.7
70.0	2.730	2.278	0.452	5.7	6.0
80.0	2.724	2.317	0.407	6.4	6.7
90.0	2.730	2.290	0.440	5.9	6.2
100.0	2.752	2.275	0.477	5.4	5.8
110.0	2.788	2.311	0.477	5.4	5.8
120.0	2.783	2.289	0.494	5.3	5.6
130.0	2.799	2.319	0.480	5.4	5.8
140.0	2.784	2.298	0.486	5.3	5.7
150.0	2.790	2.328	0.462	5.6	6.0
160.0	2.781	2.313	0.468	5.5	5.9
170.0	2.812	2.325	0.487	5.3	5.8
180.0	2.874	2.318	0.556	4.7	5.2
190.0	2.767	2.280	0.487	5.3	5.7
200.0	2.769	2.270	0.499	5.2	5.5
210.0	2.767	2.318	0.449	5.8	6.2
220.0	2.765	2.318	0.447	5.8	6.2
230.0	2.765	2.293	0.472	5.5	5.9
242.0	2.750	2.295	0.455	5.7	6.0
250.0	2.761	2.291	0.470	5.5	5.9
260.0	2.752	2.308	0.444	5.8	6.2
270.0	2.755	2.394	0.361	7.2	7.6
280.0	2.759	2.332	0.427	6.1	6.5
290.0	2.729	2.457	0.272	9.5	10.0
300.0	2.764	2.374	0.390	6.7	7.1
310.0	2.760	2.321	0.439	5.9	6.3
320.0	2.759	2.304	0.455	5.7	6.1
330.0	2.737	2.383	0.354	7.3	7.7
340.0	2.721	2.383	0.338	7.7	8.1
350.0	2.752	2.390	0.362	7.2	7.6
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.757	2.313	0.451	4.7	5.2

RSRM-1A Aft Field Joint Performance

Table 8

RSRM-1A CENTER FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.751	2.480	0.271	9.6	10.2
10.0	2.754	2.490	0.264	9.8	10.4
20.0	2.741	2.539	0.202	12.8	13.6
30.0	2.737	2.501	0.236	11.0	11.6
40.0	2.736	2.505	0.231	11.2	11.8
50.0	2.749	2.484	0.265	9.8	10.4
60.0	2.735	2.493	0.242	10.7	11.3
70.0	2.770	2.480	0.290	8.9	9.6
80.0	2.760	2.438	0.322	8.1	8.6
90.0	2.774	2.515	0.259	10.0	10.7
100.0	2.765	2.513	0.252	10.3	11.0
110.0	2.759	2.465	0.294	8.8	9.4
120.0	2.753	2.445	0.308	8.4	8.9
130.0	2.752	2.495	0.257	10.1	10.7
140.0	2.763	2.510	0.253	10.3	10.9
150.0	2.761	2.480	0.281	9.2	9.8
160.0	2.775	2.515	0.260	10.0	10.7
170.0	2.763	2.505	0.258	10.1	10.7
180.0	2.753	2.502	0.251	10.3	11.0
190.0	2.741	2.542	0.199	13.0	13.8
200.0	2.744	2.515	0.229	11.3	12.0
210.0	2.764	2.532	0.232	11.2	11.9
220.0	2.738	2.528	0.210	12.4	13.0
230.0	2.755	2.534	0.221	11.7	12.5
242.0	2.734	2.494	0.240	10.8	11.4
250.0	2.737	2.522	0.215	12.1	12.7
260.0	2.732	2.520	0.212	12.2	12.9
270.0	2.736	2.500	0.236	11.0	11.6
280.0	2.747	2.508	0.239	10.9	11.5
290.0	2.742	2.491	0.251	10.3	10.9
300.0	2.740	2.510	0.230	11.3	11.9
310.0	2.739	2.495	0.244	10.6	11.2
320.0	2.727	2.504	0.223	11.6	12.2
330.0	2.737	2.496	0.241	10.8	11.4
340.0	2.745	2.486	0.259	10.0	10.6
350.0	2.738	2.487	0.251	10.3	10.9
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.746	2.501	0.247	8.1	8.6

RSRM-1A Center Field Joint Performance

Table 9

RSRM-1A FORWARD FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.740	2.501	0.239	10.9	11.5
10.0	2.703	2.549	0.154	16.9	17.6
20.0	2.713	2.604	0.109	23.8	24.9
30.0	2.733	2.658	0.075	34.6	36.4
40.0	2.711	2.630	0.081	32.0	33.5
50.0	2.772	2.583	0.189	13.7	14.7
60.0	2.765	2.609	0.156	16.6	17.7
70.0	2.749	2.591	0.158	16.4	17.4
80.0	2.746	2.603	0.143	18.1	19.2
90.0	2.768	2.608	0.160	16.2	17.3
100.0	2.760	2.590	0.170	15.3	16.2
110.0	2.771	2.663	0.108	24.0	25.7
120.0	2.768	2.582	0.186	14.0	14.9
130.0	2.782	2.612	0.170	15.3	16.4
140.0	2.798	2.618	0.180	14.4	15.5
150.0	2.795	2.613	0.182	14.3	15.4
160.0	2.762	2.590	0.172	15.1	16.1
170.0	2.758	2.598	0.160	16.2	17.2
180.0	2.775	2.665	0.110	23.6	25.2
190.0	2.777	2.667	0.110	23.6	25.2
200.0	2.754	2.582	0.172	15.1	16.0
210.0	2.753	2.585	0.168	15.4	16.4
220.0	2.743	2.593	0.150	17.3	18.3
230.0	2.755	2.578	0.177	14.7	15.6
242.0	2.745	2.575	0.170	15.3	16.1
250.0	2.734	2.571	0.163	15.9	16.8
260.0	2.726	2.599	0.127	20.4	21.5
270.0	2.728	2.585	0.143	18.1	19.1
280.0	2.730	2.781	0.000	+	+
290.0	2.759	2.620	0.139	18.7	19.8
300.0	2.763	2.602	0.161	16.1	17.2
310.0	2.770	2.588	0.182	14.3	15.2
320.0	2.766	2.586	0.180	14.4	15.4
330.0	2.762	2.580	0.182	14.3	15.2
340.0	2.770	2.575	0.195	13.3	14.2
350.0	2.789	2.543	0.246	10.5	11.3
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.760	2.592	0.162	10.5	11.3

A " + " INDICATES THAT NEGLIGIBLE MATERIAL DECOMPOSITION HAS OCCURRED.

RSRM-1A Forward Field Joint Performance

RSRM 1-A Aft Dome
COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
9.3	4.06	6.17	5.43	4.45	3.49	4.35	4.44	3.81	3.50	3.39	3.33	3.59	2.77	2.43	2.74	4.20	2.43	291.6	1.5
10.7	3.10	3.93	3.25	3.04	2.84	3.45	3.94	3.13	3.04	2.74	2.78	2.74	2.64	2.23	2.46	4.18	2.23	291.6	1.5
12.0	3.01	3.72	3.61	3.04	2.82	3.16	3.69	2.93	2.94	2.64	2.82	2.65	2.74	2.35	2.24	3.16	2.24	316.8	1.5
13.1	2.92	3.24	2.96	3.06	2.82	3.09	3.66	2.94	2.98	2.62	2.76	2.65	2.82	2.37	2.25	3.28	2.25	316.8	1.5
14.4	2.98	3.43	2.66	2.88	2.73	3.22	3.74	2.94	2.78	2.69	2.81	2.69	2.89	2.31	2.25	3.22	2.25	316.8	1.5
16.0	2.78	3.24	2.91	2.71	2.66	3.23	3.61	2.91	2.72	2.54	2.58	2.50	3.07	2.22	2.10	2.96	2.10	316.8	1.5
17.3	2.70	3.16	2.78	2.80	2.60	3.46	3.56	2.97	2.65	2.56	2.88	2.41	3.01	2.16	2.11	2.97	2.11	316.8	1.5
18.5	2.81	3.24	3.01	3.02	2.92	3.85	3.54	3.25	2.78	2.77	2.91	2.49	3.43	2.32	2.76	3.19	2.32	291.6	1.5
19.5	2.79	3.22	3.01	3.05	2.78	3.87	3.71	2.89	2.95	2.89	3.20	2.82	3.28	2.40	2.49	3.03	2.40	291.6	1.5
21.3	2.61	3.11	2.88	3.39	2.79	3.69	2.94	3.10	2.84	2.85	3.56	2.57	3.23	2.28	2.34	2.62	2.28	291.6	1.5
24.3	2.89	2.98	2.74	2.91	2.45	2.99	2.68	3.07	2.42	2.60	3.23	2.56	3.09	2.50	2.30	2.46	2.30	316.8	1.5
33.0	2.73	2.69	2.46	2.33	2.50	2.36	2.72	2.43	2.79	2.62	2.84	2.96	2.84	2.58	2.53	2.64	2.33	68.4	1.5
37.0	5.94	6.74	4.63	4.18	4.19	3.30	3.75	3.62	4.81	3.78	4.12	5.54	4.06	4.40	3.03	3.27	3.03	316.8	1.5
40.0	3.08	2.65	2.43	3.01	2.46	2.75	2.56	2.61	2.75	3.01	3.01	2.88	3.12	3.16	2.50	2.92	2.43	46.8	1.5
42.0	2.47	2.36	2.07	2.38	2.10	2.29	2.36	2.44	2.77	2.68	3.00	2.65	2.67	2.56	2.39	2.32	2.07	46.8	1.5
45.0	2.23	2.05	2.02	2.04	2.21	2.33	2.30	2.44	2.70	2.47	2.98	2.60	2.39	2.48	2.41	2.30	2.02	46.8	1.5
48.0	2.48	2.33	2.07	2.19	1.97	2.60	2.97	3.29	3.26	2.75	3.67	3.11	2.79	2.64	3.40	3.34	1.97	90.0	1.5
53.0	3.11	4.59	2.92	3.90	3.23	3.49	3.90	3.11	3.14	3.28	3.90	3.76	3.62	4.71	3.54	4.09	2.92	46.8	1.5

SEGMENT MINIMUM = 1.97 AT THE 48.0 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE
9.3	4.39	6.52	5.80	4.82	3.82	4.73	4.81	4.20	3.79	3.65	3.62	3.87	3.00	2.61	2.98	4.54	2.61	291.6
10.7	3.37	4.22	3.58	3.30	3.12	3.72	4.23	3.47	3.31	3.02	3.05	2.94	2.84	2.43	2.75	4.51	2.43	291.6
12.0	3.29	4.00	3.77	3.31	3.11	3.42	3.96	3.22	3.22	2.94	3.08	2.84	2.96	2.57	2.52	3.41	2.52	316.8
13.1	3.18	3.56	3.22	3.31	3.13	3.34	3.94	3.23	3.28	2.91	3.00	2.81	3.03	2.60	2.54	3.52	2.54	316.8
14.4	3.17	3.61	2.96	3.09	2.97	3.41	3.93	3.15	3.00	2.94	2.99	2.81	3.04	2.48	2.49	3.38	2.48	291.6
16.0	3.02	3.50	3.18	2.97	2.97	3.51	3.88	3.18	2.99	2.84	2.80	2.69	3.27	2.45	2.39	3.16	2.39	316.8
17.3	3.04	3.53	3.16	3.17	3.00	3.88	3.97	3.34	3.04	2.94	3.22	2.69	3.31	2.46	2.49	3.29	2.46	291.6
18.5	3.24	3.72	3.48	3.47	3.42	4.38	4.03	3.72	3.24	3.23	3.30	2.83	3.85	2.68	3.28	3.59	2.68	291.6
19.5	3.28	3.75	3.55	3.56	3.30	4.48	4.30	3.38	3.50	3.44	3.69	3.29	3.77	2.84	3.02	3.46	2.84	291.6
21.3	3.14	3.69	3.47	4.03	3.40	4.34	3.52	3.69	3.45	3.46	4.20	3.13	3.78	2.77	2.86	3.07	2.77	291.6
24.3	3.43	3.48	3.27	3.43	2.96	3.50	3.19	3.59	2.95	3.09	3.79	3.01	3.58	2.98	2.74	2.88	2.74	316.8
33.0	3.06	3.01	2.78	2.67	2.83	2.66	3.08	2.75	3.19	2.93	3.15	3.26	3.09	2.87	2.89	2.89	2.66	111.6
37.0	6.72	7.62	5.37	5.01	5.13	3.97	4.60	4.44	5.66	4.49	4.93	6.50	4.70	5.26	3.91	4.11	3.91	316.8
40.0	3.42	2.94	2.71	3.35	2.90	3.09	2.89	2.99	3.02	3.37	3.27	3.28	3.42	3.52	2.84	3.23	2.71	46.8
42.0	2.79	2.66	2.40	2.65	2.53	2.60	2.68	2.88	3.07	2.98	3.31	2.96	2.91	2.89	2.76	2.67	2.40	46.8
45.0	2.66	2.44	2.37	2.44	2.71	2.70	2.62	2.81	3.04	2.76	3.20	2.94	2.69	2.84	2.76	2.63	2.37	46.8
48.0	3.21	3.07	2.64	2.90	2.75	3.09	3.47	3.86	3.79	3.18	4.15	3.70	3.36	3.37	3.98	3.97	2.64	46.8
53.0	3.51	5.05	3.36	4.16	3.76	3.84	4.33	3.61	3.59	3.80	4.26	4.18	3.97	5.14	4.14	4.56	3.36	46.8

SEGMENT MINIMUM = 2.37 AT THE 45.0 INCH STATION.

RSRM-1A Aft Dome Insulation Performance

Table 11

RSRM 1-A Aft Dome
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MAX.	AVE.	MEDIAN	STANDARD DEVIATION
9.3	1.207	0.794	0.902	1.101	1.406	1.126	1.103	1.287	1.402	1.444	1.472	1.366	1.770	2.015	1.789	1.166	2.015	1.334	1.327	0.324
10.7	1.517	1.196	1.446	1.544	1.654	1.361	1.193	1.500	1.546	1.713	1.691	1.714	1.780	2.103	1.910	1.125	2.103	1.562	1.545	0.265
12.0	1.493	1.211	1.248	1.482	1.598	1.426	1.221	1.538	1.532	1.704	1.594	1.695	1.643	1.914	2.010	1.423	2.010	1.546	1.535	0.224
13.1	1.471	1.328	1.453	1.407	1.524	1.392	1.175	1.464	1.441	1.644	1.560	1.621	1.527	1.812	1.908	1.311	1.908	1.502	1.467	0.183
14.4	1.376	1.196	1.542	1.423	1.500	1.272	1.097	1.394	1.473	1.524	1.457	1.522	1.417	1.774	1.823	1.275	1.823	1.442	1.440	0.187
16.0	1.358	1.167	1.300	1.394	1.419	1.169	1.048	1.297	1.392	1.487	1.463	1.514	1.232	1.699	1.804	1.279	1.804	1.376	1.375	0.194
17.3	1.320	1.128	1.280	1.272	1.369	1.028	0.999	1.200	1.342	1.391	1.234	1.480	1.181	1.645	1.688	<1.197	1.688	1.297	1.276	0.192
18.5	1.197	1.036	1.117	1.113	1.152	0.873	0.948	1.035	1.209	1.213	1.153	1.352	0.979	1.450	1.219	1.054	1.450	1.131	1.135	0.147
19.5	1.129	0.977	1.048	1.033	1.135	0.813	0.850	1.089	1.066	1.090	0.984	1.116	0.959	1.310	1.263	1.038	1.310	1.056	1.057	0.129
21.3	1.127	0.944	1.022	0.868	1.053	0.797	0.999	0.949	1.034	1.030	0.825	1.143	0.910	1.287	1.256	1.121	1.287	1.023	1.026	0.141
24.3	1.018	0.986	1.074	1.010	1.202	0.983	1.097	0.959	1.215	1.130	0.911	1.149	0.950	1.176	1.281	1.197	1.281	1.084	1.086	0.113
33.0	1.171	1.191	1.300	1.372	1.278	1.355	1.178	1.318	1.146	1.222	1.126	1.081	1.126	1.238	1.264	1.214	1.372	1.224	1.218	0.086
37.0	0.438	0.386	0.562	0.622	0.620	0.788	0.694	0.718	0.541	0.687	0.631	0.469	0.641	0.591	0.858	0.796	0.858	0.628	0.627	0.131
40.0	0.843	0.982	1.072	0.864	1.059	0.947	1.016	0.998	0.946	0.864	0.863	0.903	0.832	0.822	1.040	0.889	1.072	0.934	0.924	0.085
42.0	1.051	1.102	1.255	1.092	1.241	1.136	1.100	1.065	0.937	0.971	0.866	0.980	0.975	1.016	1.088	1.121	1.255	1.062	1.077	0.104
45.0	1.165	1.269	<1.285	<1.276	<1.179	1.114	1.132	1.067	0.962	1.051	0.872	1.000	1.087	1.050	1.078	1.132	1.285	1.107	1.100	0.114
48.0	1.048	1.118	1.255	<1.185	<1.318	<0.999	0.876	0.790	0.798	0.945	0.709	0.835	0.933	0.983	0.764	0.779	1.318	0.958	0.939	0.185
53.0	1.084	0.734	1.155	0.863	1.043	0.967	0.865	1.084	1.073	1.027	0.864	0.896	0.931	0.715	0.952	0.823	1.155	0.942	0.942	0.129

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	AVERAGE	EXPOSURE TIME
9.3	9.9	6.5	7.4	9.1	11.6	9.3	9.1	10.6	11.5	11.9	12.1	11.2	14.6	16.6	14.7	9.6	11.0	121.6
10.7	12.7	10.0	12.1	12.9	13.9	11.4	10.0	12.6	12.9	14.3	14.2	14.4	14.9	17.6	16.0	9.4	13.1	119.4
12.0	12.8	10.4	10.7	12.7	13.7	12.3	10.5	13.2	13.2	14.6	13.7	14.6	14.1	16.4	17.3	12.2	13.3	116.4
13.1	12.9	11.7	12.8	12.4	13.4	12.2	10.3	12.9	12.7	14.5	13.7	14.3	13.4	15.9	16.8	11.5	13.2	113.7
14.4	12.3	10.7	13.8	12.7	13.4	11.4	9.8	12.5	13.2	13.6	13.0	13.6	12.7	15.9	16.3	11.4	12.9	111.9
16.0	12.6	10.8	12.1	12.9	13.2	10.9	9.7	12.0	12.9	13.8	13.6	14.1	11.4	15.8	16.8	11.9	12.8	107.7
17.3	12.6	10.8	12.2	12.1	13.1	9.8	9.5	11.4	12.8	13.3	11.8	14.1	11.3	15.7	16.1	11.4	12.4	104.9
18.5	11.7	10.1	10.9	10.8	11.2	8.5	9.2	10.1	11.8	11.8	11.2	13.2	9.5	14.1	11.9	10.3	11.0	102.7
19.5	11.2	9.7	10.4	10.3	11.3	8.1	8.4	10.8	10.6	10.8	9.8	11.1	9.5	13.0	12.5	10.3	10.5	100.7
21.3	11.6	9.7	10.5	8.9	10.8	8.2	10.3	9.7	10.6	10.6	8.5	11.7	9.3	13.2	12.9	11.5	10.5	97.4
24.3	10.9	10.6	11.5	10.8	12.9	10.5	11.7	10.3	13.0	12.1	9.8	12.3	10.2	12.6	13.7	12.8	11.6	93.4
33.0	14.1	14.3	15.6	16.5	15.3	16.3	14.1	15.8	13.8	14.7	13.5	13.0	13.5	14.9	15.2	14.6	14.7	83.3
37.0	5.6	4.9	7.1	7.9	7.9	10.0	8.8	9.1	6.9	8.7	8.0	5.9	8.1	7.5	10.9	10.1	8.0	78.9
40.0	10.9	12.7	13.9	11.2	13.7	12.3	13.2	12.9	12.3	11.2	11.2	11.7	10.8	10.7	13.5	11.5	12.1	77.1
42.0	13.8	14.5	16.5	14.3	16.3	14.9	14.5	14.0	12.3	12.8	11.4	12.9	12.8	13.4	14.3	14.7	14.0	76.1
45.0	15.6	17.0	17.2	17.1	15.8	14.9	15.2	14.3	12.9	14.1	11.7	13.4	14.6	14.1	14.4	15.2	14.8	74.7
48.0	14.8	15.8	17.7	16.7	18.6	14.1	12.4	11.1	11.3	13.3	10.0	11.8	13.2	13.9	10.8	11.0	13.5	70.9
53.0	14.6	9.9	15.5	11.6	14.0	13.0	11.6	14.6	14.4	13.8	11.6	12.0	12.5	9.6	12.8	11.0	12.6	74.5

RSRM-1A Aft Dome Insulation Performance (Cont'd)

Table 11 (Cont'd)

RSRM 1-A Aft Dome
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MIN.	MEDIAN	STANDARD DEVIATION	MDT
9.3	5.299	5.176	5.229	5.308	5.374	5.331	5.308	5.407	5.320	5.264	5.326	5.282	5.311	5.264	5.339	5.297	5.176	5.308	0.054	4.900
10.7	5.114	5.042	5.175	5.094	5.168	5.062	5.042	5.204	5.116	5.180	5.154	5.042	5.051	5.120	5.248	5.070	5.042	5.115	0.065	4.700
12.0	4.907	4.849	4.703	4.911	4.976	4.871	4.841	4.957	4.939	5.011	4.911	4.812	4.858	4.922	5.057	4.857	4.703	4.909	0.084	4.500
13.1	4.683	4.726	4.681	4.664	4.768	4.650	4.632	4.723	4.724	4.785	4.674	4.561	4.623	4.715	4.840	4.615	4.561	4.682	0.070	4.300
14.4	4.357	4.321	4.571	4.397	4.460	4.343	4.315	4.390	4.413	4.473	4.358	4.274	4.308	4.391	4.545	4.305	4.274	4.374	0.086	4.100
16.0	4.107	4.080	4.131	4.146	4.208	4.107	4.069	4.129	4.167	4.220	4.103	4.071	4.031	4.160	4.309	4.048	4.031	4.118	0.072	3.780
17.3	4.019	3.982	4.043	4.037	4.102	3.990	3.968	4.005	4.075	4.089	3.971	3.983	3.912	4.049	4.200	3.943	3.912	4.012	0.071	3.560
18.5	3.876	3.850	3.889	3.860	3.939	3.826	3.820	3.848	3.914	3.914	3.810	3.829	3.768	3.888	3.999	3.788	3.768	3.855	0.060	3.360
19.5	3.701	3.662	3.716	3.676	3.742	3.644	3.654	3.682	3.734	3.745	3.635	3.669	3.614	3.726	3.819	3.593	3.593	3.679	0.057	3.150
21.3	3.540	3.480	3.542	3.496	3.585	3.459	3.514	3.502	3.570	3.563	3.467	3.572	3.442	3.568	3.595	3.436	3.436	3.527	0.053	2.940
24.3	3.495	3.429	3.514	3.461	3.559	3.441	3.494	3.446	3.588	3.495	3.456	3.456	3.397	3.509	3.505	3.444	3.397	3.477	0.049	2.940
33.0	3.584	3.584	3.610	3.666	3.611	3.599	3.634	3.626	3.654	3.583	3.551	3.528	3.484	3.554	3.650	3.505	3.484	3.592	0.053	3.200
37.0	2.942	2.942	3.020	3.115	3.180	3.125	3.195	3.189	3.061	3.086	3.108	3.048	3.013	3.109	3.354	3.269	2.942	3.109	0.111	2.600
40.0	2.885	2.885	2.903	2.891	3.068	2.923	2.938	2.985	2.855	2.909	2.823	2.963	2.846	2.896	2.953	2.870	2.823	2.900	0.060	2.600
42.0	2.935	2.935	3.013	2.889	3.134	2.959	2.944	3.065	2.872	2.892	2.864	2.902	2.835	2.932	3.001	2.994	2.835	2.935	0.079	2.600
45.0	3.095	3.095	3.041	3.115	3.196	3.009	2.968	2.997	2.922	2.903	2.790	2.942	2.921	2.978	2.980	2.982	2.790	2.981	0.098	2.600
48.0	3.363	3.432	3.319	3.432	3.623	3.083	3.038	3.046	3.025	3.002	2.942	3.088	3.137	3.317	3.041	3.092	2.942	3.090	0.199	2.600
53.0	3.807	3.705	3.879	3.587	3.921	3.711	3.749	3.918	3.853	3.900	3.684	3.746	3.699	3.673	3.938	3.755	3.587	3.752	0.107	3.370

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	MEDIAN	STANDARD DEVIATION
9.3	4.092	4.382	4.327	4.207	3.968	4.205	4.205	4.120	3.918	3.820	3.854	3.916	3.541	3.249	3.550	4.131	3.249	4.030	0.311
10.7	3.597	3.846	3.729	3.550	3.514	3.701	3.849	3.704	3.570	3.467	3.463	3.328	3.271	3.017	3.338	3.945	3.017	3.560	0.243
12.0	3.414	3.638	3.455	3.429	3.378	3.445	3.620	3.419	3.407	3.307	3.317	3.117	3.215	3.008	3.047	3.434	3.008	3.411	0.180
13.1	3.212	3.398	3.228	3.257	3.244	3.258	3.457	3.259	3.283	3.141	3.114	2.940	3.096	2.903	2.932	3.304	2.903	3.236	0.160
14.4	2.981	3.125	3.029	2.974	2.960	3.071	3.218	2.996	2.940	2.949	2.901	2.752	2.891	2.617	2.722	3.030	2.617	2.967	0.151
16.0	2.749	2.913	2.831	2.752	2.789	2.938	3.021	2.832	2.775	2.733	2.640	2.557	2.799	2.461	2.505	2.769	2.461	2.772	0.152
17.3	2.699	2.854	2.763	2.765	2.733	2.962	2.969	2.805	2.733	2.698	2.737	2.503	2.731	2.404	2.512	2.746	2.404	2.735	0.151
18.5	2.679	2.814	2.772	2.747	2.787	2.953	2.872	2.813	2.705	2.701	2.657	2.477	2.789	2.438	2.780	2.734	2.438	2.760	0.130
19.5	2.572	2.685	2.668	2.643	2.607	2.831	2.804	2.593	2.668	2.655	2.651	2.553	2.655	2.416	2.556	2.555	2.416	2.647	0.099
21.3	2.413	2.536	2.520	2.628	2.532	2.662	2.515	2.553	2.536	2.533	2.642	2.429	2.532	2.281	2.339	2.315	2.281	2.532	0.113
24.3	2.477	2.443	2.440	2.451	2.357	2.458	2.397	2.487	2.373	2.365	2.545	2.307	2.447	2.333	2.224	2.247	2.224	2.419	0.088
33.0	2.413	2.393	2.310	2.294	2.335	2.244	2.456	2.308	2.508	2.361	2.425	2.447	2.358	2.316	2.386	2.291	2.244	2.360	0.072
37.0	2.504	2.556	2.458	2.493	2.560	2.337	2.501	2.471	2.520	2.399	2.477	2.579	2.372	2.518	2.496	2.473	2.337	2.495	0.066
40.0	2.042	1.903	1.831	2.027	2.009	1.976	1.922	1.987	1.909	2.045	1.960	2.060	2.014	2.074	1.913	1.981	1.831	1.984	0.068
42.0	1.884	1.833	1.758	1.797	1.893	1.823	1.844	2.000	1.935	1.921	1.998	1.922	1.860	1.916	1.913	1.873	1.758	1.888	0.066
45.0	1.930	1.826	1.756	1.839	2.017	1.895	1.836	1.930	1.960	1.852	1.918	1.942	1.834	1.928	1.902	1.850	1.756	1.898	0.065
48.0	2.315	2.314	2.064	2.247	2.305	2.084	2.162	2.256	2.227	2.057	2.233	2.253	2.204	2.334	2.277	2.313	2.057	2.250	0.091
53.0	2.723	2.971	2.724	2.724	2.878	2.744	2.884	2.834	2.780	2.873	2.820	2.850	2.768	2.958	2.986	2.932	2.723	2.842	0.091

RSRM-1A Aft Dome Insulation Performance (Cont'd)

Table 11(Cont'd)

RSRM 1-A Aft Cylinder

COMPLIANCE SAFETY FACTOR (CSF)

STATION	DEGREE LOCATION																		REQUIRED
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE	SAFETY FACTOR
56.0	3.01	3.23	2.86	2.77	3.07	3.47	3.80	2.84	2.89	3.13	4.54	3.88	3.63	3.63	3.69	3.79	2.77	68.4	2.0
68.0	5.10	4.29	4.89	3.79	3.52	1.68	5.54	4.38	3.38	1.75	2.91	3.48	4.51	2.81	3.58	1.90	1.68	111.6	1.5
72.0	3.95	5.21	4.52	5.25	5.03	4.77	4.46	3.37	4.11	3.03	3.66	4.49	4.63	4.16	3.27	4.18	3.03	201.6	1.5
75.0	4.71	4.72	5.04	5.23	5.39	4.37	3.61	3.15	3.53	5.34	3.59	7.17	3.89	3.90	3.21	4.25	3.15	158.4	1.5
78.0	4.85	4.34	4.65	3.10	3.71	4.47	3.49	3.31	3.78	3.52	4.03	5.61	2.89	3.81	2.96	3.56	2.89	270.0	1.5
81.0	3.79	3.17	4.29	3.49	3.37	4.14	3.64	3.45	3.83	4.93	3.77	8.92	4.24	3.65	3.04	3.74	3.04	316.8	1.5
85.0	3.24	3.12	2.31	3.07	3.52	3.03	3.40	3.35	3.50	4.02	3.49	6.77	3.19	3.72	2.02	3.12	2.02	316.8	1.5
90.0	3.10	2.92	3.04	3.03	3.12	3.00	3.10	3.00	3.29	4.05	3.68	5.48	3.39	3.28	3.07	3.66	2.92	21.6	1.5
98.0	2.92	2.60	2.52	3.08	2.88	4.38	2.80	2.99	2.87	3.17	2.90	3.13	3.17	2.65	3.13	3.07	2.52	46.8	1.5
105.8	2.94		2.49		2.51		2.87		2.98		2.62		2.52		2.60		2.49	46.8	1.5
116.0	2.71		2.44		2.55		2.76		2.95		2.98		2.99		2.59		2.44	46.8	1.5
124.5	2.68		2.55		2.52		2.36		3.03		2.74		2.54		2.66		2.36	136.8	1.5
133.0	2.88		2.57		2.84		2.55		3.38		2.80		2.35		2.84		2.35	270.0	1.5
145.5	2.29		2.30		2.25		2.34		2.38		2.12		2.04		2.22		2.04	270.0	1.5
158.5	2.39		2.46		2.30		2.32		2.42		2.27		2.20		2.89		2.20	270.0	1.5
168.3	1.41<		1.44<		3.50		3.40		2.81		2.82		2.34		3.17		1.41	0.0	1.5
177.7	2.90		3.98		2.29		2.39		2.51		2.40		2.36		2.39		2.29	90.0	2.0
192.5	2.52		2.63		2.42		2.34		2.58		2.47		2.23		2.13		2.13	316.8	1.5
202.5	2.84		2.73		2.46		2.50		2.63		2.53		2.25		2.12		2.12	316.8	1.5
214.0	2.71		2.49		2.71		2.45		2.60		2.52		2.35		2.47		2.35	270.0	1.5
227.3	2.13		2.57		2.43		2.37		2.18		2.06		2.32		2.17		2.06	226.8	1.5
238.3	2.55		4.21		2.22		2.26		2.16		1.92		2.05		2.02		1.92	226.8	1.5
250.0	2.85		3.01		2.61		2.47		2.36		2.72		2.13		2.09		2.09	316.8	1.5
267.0	4.46		4.59		3.73		3.29		2.92		2.54		3.21		3.91		2.54	226.8	1.5
283.9	2.73		2.59		2.36		3.10		3.24		2.38		2.87		2.62		2.36	90.0	1.5
299.1	1.02<		3.02		2.80		3.92		3.32		3.81		4.16		2.65		1.02	0.0	2.0
322.0	3.19		1.49<		3.42		3.33		3.55		3.52		3.22		17.27		1.49	46.8	1.5
339.0	3.69		1.63		4.47		4.52		3.88		3.49		4.00		+		1.63	46.8	1.5
344.0	4.37		3.02		2.44		3.04		1.53		2.48		7.17		4.00		1.53	180.0	1.5
358.0	9.05		+		+		+		+		+		9.50		+		9.05	0.0	1.5
363.0	4.94		3.52		47.50		4.04		14.62		4.00		11.52		20.00		3.52	46.8	1.5
367.0	2.95		4.27		+		4.42		4.18		3.49		3.69		+		2.95	0.0	1.5
372.0	2.86		4.12		4.08		2.80		3.39		3.42		2.76		13.79		2.76	270.0	1.5
375.0	20.87		2.00		8.14		4.66		5.11		4.25		4.03		9.60		2.00	46.8	1.5
377.5	4.08		1.83		2.09		2.10		4.34		1.86		2.47		3.05		1.83	46.8	1.5

SEGMENT MINIMUM = 1.02 AT THE 299.1 INCH STATION.

A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1A Aft Cylinder Insulation Performance

Table 12

RSRM 1-A Aft Cylinder
ACTUAL SAFETY FACTOR (ASF)

STATION	DEGREE LOCATION																	
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE
56.0	3.81	4.20	3.70	3.57	3.96	4.32	4.79	3.55	3.75	4.13	5.58	4.78	4.44	4.75	4.77	4.72	3.55	158.4
68.0	6.05	5.21	6.09	4.61	4.33	3.04	6.73	4.98	4.48	2.76	3.87	4.74	5.57	3.90	4.57	2.97	2.76	201.6
72.0	4.43	5.55	4.87	5.58	5.36	5.15	4.68	3.64	4.41	3.69	4.14	5.15	4.98	4.61	3.73	4.48	3.64	158.4
75.0	4.87	4.87	5.47	5.25	5.45	4.81	3.97	3.54	4.06	5.92	4.02	7.76	4.22	4.34	3.77	4.49	3.54	158.4
78.0	4.87	4.35	4.76	3.38	3.88	4.71	3.68	3.46	3.82	4.07	4.24	5.95	3.01	4.05	3.29	3.72	3.01	270.0
81.0	3.99	3.40	4.56	3.70	3.61	4.45	3.97	3.67	4.16	5.53	3.98	9.66	4.52	3.99	3.42	3.98	3.40	21.6
85.0	3.75	3.68	3.08	3.59	4.10	3.69	4.01	3.96	4.20	4.76	4.10	7.98	3.75	4.33	2.75	3.64	2.75	316.8
90.0	3.49	3.25	3.47	3.55	3.55	3.40	3.47	3.38	3.74	4.58	4.00	6.13	3.75	3.66	3.33	4.00	3.25	21.6
98.0	3.68	3.21	3.17	3.86	3.56	5.35	3.59	3.66	3.63	4.09	3.46	3.89	3.96	3.42	3.87	3.84	3.17	46.8
105.8	3.09		2.60		2.61		3.08		3.10		2.69		2.64		2.71		2.60	46.8
116.0	2.91		2.59		2.68		2.99		3.04		3.03		3.09		2.64		2.59	46.8
124.5	2.83		2.68		2.67		2.67		3.22		3.03		2.71		2.80		2.67	136.8
133.0	3.12		2.94		3.13		2.85		3.86		3.37		2.75		3.13		2.75	270.0
145.5	2.35		2.42		2.42		2.46		2.49		2.28		2.23		2.30		2.23	270.0
158.5	2.48		2.63		2.51		2.47		2.60		2.50		2.39		3.00		2.39	270.0
168.3	2.22		2.27		3.97		3.90		3.38		3.43		2.87		3.65		2.22	0.0
177.7	4.22		5.95		3.43		3.51		3.73		3.52		3.49		3.50		3.43	90.0
192.5	2.83		3.03		2.90		2.79		3.04		2.84		2.70		2.51		2.51	316.8
202.5	2.85		2.77		2.51		2.61		2.73		2.61		2.34		2.18		2.18	316.8
214.0	2.74		2.52		2.74		2.53		2.68		2.52		2.42		2.53		2.42	270.0
227.3	2.54		3.06		2.76		2.81		2.80		2.58		2.77		2.61		2.54	0.0
238.3	3.11		5.13		2.66		2.74		2.67		2.35		2.49		2.44		2.35	226.8
250.0	2.89		3.03		2.63		2.52		2.45		2.81		2.23		2.10		2.10	316.8
267.0	4.58		4.88		3.82		3.46		3.06		2.66		3.37		3.98		2.66	226.8
283.9	2.98		2.93		2.66		3.32		3.36		2.71		2.96		2.86		2.66	90.0
299.1	2.35		4.80		4.48		5.95		5.18		5.84		6.34		3.99		2.35	0.0
322.0	3.43		2.19		3.70		3.58		3.83		3.87		3.58		18.41		2.19	46.8
339.0	3.93		2.39		4.81		4.82		4.15		3.84		4.40		+		2.39	46.8
344.0	5.16		3.71		3.17		3.62		2.49		3.02		8.60		4.80		2.49	180.0
358.0	9.71		+		+		+		+		+		10.23		+		9.71	0.0
363.0	6.65		4.61		65.25		5.61		19.08		5.15		14.94		25.84		4.61	46.8
367.0	3.56		5.08		+		5.20		4.93		4.22		4.48		+		3.56	0.0
372.0	3.61		4.59		4.66		3.66		3.86		3.96		3.52		15.34		3.52	270.0
375.0	22.30		2.87		9.49		5.43		5.81		4.85		4.75		11.32		2.87	46.8
377.5	5.77		3.03		3.26		3.27		5.18		2.98		3.76		4.74		2.98	226.8

SEGMENT MINIMUM = 2.10 AT THE 250.0 INCH STATION.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1A Aft Cylinder Insulation Performance (Cont'd)

Table 12 (Cont'd)

RSRM 1-A Aft Cylinder
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MAX.	AVE.	MEDIAN	STANDARD DEVIATION
56.0	0.928	0.863	0.977	1.006	0.910	0.803	0.735	0.984	0.966	0.890	0.615	0.719	0.769	0.769	0.756	0.736	1.006	0.839	0.833	0.117
68.0	0.431	0.513	0.450	0.580	0.625	1.307<	0.397	0.502	0.650	1.258<	0.757	0.632	0.488	0.783	0.614	1.155<	1.307	0.696	0.620	0.292
72.0	0.506	0.384	0.442	0.381	0.398	0.419	0.448	0.594	0.487	0.661	0.547	0.445	0.432	0.481	0.612	0.478	0.661	0.482	0.463	0.083
75.0	0.382	0.381	0.357	0.344	0.334	0.412	0.499	0.571	0.510	0.337	0.501	0.251	0.463	0.461	0.561	0.424	0.571	0.424	0.418	0.090
78.0	0.330	0.369	0.344	0.316	0.431	0.358	0.459	0.483	0.423	0.455	0.397	0.285	0.553	0.420	0.540	0.450	0.553	0.426	0.427	0.076
81.0	0.369	0.442	0.326	0.401	0.416	0.338	0.385	0.406	0.366	0.284	0.371	0.157	0.330	0.384	0.460	0.374	0.460	0.363	0.373	0.071
85.0	0.401	0.416	0.563	0.424	0.369	0.429	0.382	0.388	0.371	0.323	0.373	0.192	0.408	0.349	0.642<	0.416	0.642	0.403	0.395	0.097
90.0	0.408	0.433	0.416	0.418	0.405	0.422	0.408	0.422	0.384	0.312	0.344	0.231	0.373	0.386	0.412	0.346	0.433	0.383	0.407	0.053
98.0	0.389	0.436	0.450	0.369	0.394	0.259	0.405	0.379	0.395	0.358	0.391	0.363	0.358	0.428	0.363	0.370	0.450	0.382	0.384	0.043
105.8	0.367		0.433		0.431		0.376		0.362		0.412		0.428		0.416		0.433	0.403	0.414	0.030
116.0	0.387		0.430		0.411		0.381		0.356		0.352		0.351		0.405		0.430	0.384	0.384	0.030
124.5	0.384		0.404		0.408		0.436		0.340		0.376		0.405		0.387		0.436	0.393	0.396	0.028
133.0	0.340		0.381		0.345		0.385		0.290		0.350		0.417		0.345		0.417	0.357	0.347	0.038
145.5	0.406		0.404		0.413		0.398		0.391		0.439		0.456		0.419		0.456	0.416	0.410	0.022
158.5	0.368		0.358		0.383		0.379		0.363		0.387		0.400		0.305		0.400	0.368	0.374	0.029
168.3	0.603<		0.592<		0.243		0.250		0.303		0.301		0.364		0.268		0.603	0.366	0.302	0.148
177.7	0.345		0.251		0.436		0.419		0.398		0.416		0.423		0.419		0.436	0.388	0.418	0.062
192.5	0.309		0.297		0.322		0.334		0.302		0.316		0.350		0.367		0.367	0.325	0.319	0.024
202.5	0.257		0.267		0.297		0.292		0.278		0.289		0.325		0.344		0.344	0.294	0.291	0.029
214.0	0.258		0.281		0.258		0.286		0.269		0.278		0.298		0.283		0.298	0.276	0.280	0.014
227.3	0.305		0.253		0.268		0.274		0.298		0.315		0.280		0.300		0.315	0.287	0.289	0.021
238.3	0.208		0.126		0.239		0.235		0.245		0.276		0.259		0.263		0.276	0.231	0.242	0.047
250.0	0.193		0.183		0.211		0.223		0.233		0.202		0.258		0.263		0.263	0.221	0.217	0.029
267.0	0.112		0.109		0.134		0.152		0.171		0.197		0.156		0.128		0.197	0.145	0.143	0.030
283.9	0.165		0.174		0.191		0.145		0.139		0.189		0.157		0.172		0.191	0.167	0.169	0.019
299.1	0.656<		0.222		0.239		0.171		0.202		0.176		0.161		0.253		0.656	0.260	0.212	0.163
322.0	0.119		0.255<		0.111		0.114		0.107		0.108		0.118		0.022		0.255	0.119	0.113	0.064
339.0	0.103		0.233<		0.085		0.084		0.098		0.109		0.095		0		0.233	0.101	0.097	0.064
344.0	0.087		0.126		0.156		0.125		0.249<		0.153		0.053		0.095		0.249	0.131	0.126	0.059
358.0	0.042		0.001		0		0.001		0		0		0.040		0		0.042	0.011	0.001	0.019
363.0	0.077		0.108		0.008		0.094		0.026		0.095		0.033		0.019		0.108	0.058	0.055	0.040
367.0	0.129		0.089		0.001		0.086		0.091		0.109		0.103		0		0.129	0.076	0.090	0.049
372.0	0.140		0.097		0.098		0.143		0.118		0.117		0.145		0.029		0.145	0.111	0.117	0.038
375.0	0.023		0.240<		0.059		0.103		0.094		0.113		0.119		0.050		0.240	0.100	0.098	0.066
377.5	0.130		0.289<		0.253<		0.252<		0.122		0.285<		0.215		0.174		0.289	0.215	0.234	0.066

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

RSRM-1A Aft Cylinder Insulation Performance (Cont'd)

Table **12** (Cont'd)

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION	DEGREE LOCATION																EXPOSURE
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	AVERAGE	TIME
56.0	12.5	11.6	13.2	13.6	12.3	10.8	9.9	13.3	13.0	12.0	8.3	9.7	10.4	10.4	10.2	9.9	11.3	74.1
68.0	6.9	8.2	7.2	9.2	10.0	20.8	6.3	8.0	10.4	20.0	12.1	10.1	7.8	12.5	9.8	18.4	11.1	62.8
72.0	9.0	6.8	7.9	6.8	7.1	7.5	8.0	10.6	8.7	11.8	9.7	7.9	7.7	8.6	10.9	8.5	8.6	56.2
75.0	7.6	7.5	7.1	6.8	6.6	8.2	9.9	11.3	10.1	6.7	9.9	5.0	9.2	9.1	11.1	8.4	8.4	50.5
78.0	7.1	8.0	7.4	11.1	9.3	7.7	9.9	10.4	9.1	9.8	8.6	6.2	11.9	9.1	11.7	9.7	9.2	46.3
81.0	8.1	9.7	7.2	8.8	9.1	7.4	8.5	8.9	8.0	6.2	8.2	3.5	7.3	8.4	10.1	8.2	8.0	45.5
85.0	8.9	9.3	12.5	9.4	8.2	9.6	8.5	8.6	8.3	7.2	8.3	4.3	9.1	7.8	14.3	9.3	9.0	44.9
90.0	9.2	9.8	9.4	9.4	9.1	9.5	9.2	9.5	8.7	7.0	7.8	5.2	8.4	8.7	9.3	7.8	8.6	44.3
98.0	9.0	10.1	10.4	8.5	9.1	6.0	9.4	8.8	9.1	8.3	9.0	8.4	8.3	9.9	8.4	8.5	8.8	43.3
105.8	8.6		10.2		10.1		8.8		8.5		9.7		10.1		9.8		9.5	42.5
116.0	9.3		10.3		9.9		9.1		8.5		8.4		8.4		9.7		9.2	41.7
124.5	9.4		9.9		10.0		10.7		8.4		9.2		10.0		9.5		9.6	40.7
133.0	8.6		9.6		8.7		9.7		7.3		8.9		10.6		8.7		9.0	39.5
145.5	10.8		10.7		11.0		10.6		10.4		11.7		12.1		11.1		11.1	37.6
158.5	10.2		9.9		10.6		10.5		10.1		10.8		11.1		8.5		10.2	36.0
168.3	17.4		17.1		7.0		7.2		8.8		8.7		10.5		7.7		10.6	34.6
177.7	10.1		7.3		12.7		12.3		11.6		12.2		12.4		12.3		11.4	34.2
192.5	10.0		9.6		10.4		10.8		9.7		10.2		11.3		11.8		10.5	31.0
202.5	8.7		9.0		10.0		9.9		9.4		9.8		11.0		11.6		9.9	29.6
214.0	9.3		10.1		9.3		10.3		9.7		10.0		10.7		10.2		9.9	27.8
227.3	11.8		9.8		10.4		10.6		11.6		12.2		10.9		11.6		11.1	25.8
238.3	8.6		5.2		9.9		9.7		10.1		11.4		10.7		10.9		9.6	24.2
250.0	8.7		8.2		9.5		10.0		10.4		9.1		11.6		11.8		9.9	22.3
267.0	5.7		5.5		6.8		7.7		8.7		10.0		7.9		6.5		7.4	19.7
283.9	9.9		10.5		11.5		8.7		8.4		11.4		9.5		10.4		10.0	16.6
299.1	37.5		12.7		13.7		9.8		11.5		10.1		9.2		14.5		14.9	17.5
322.0	9.4		20.1		8.7		9.0		8.4		8.5		9.3		1.7		9.4	12.7
339.0	8.5		19.3		7.0		6.9		8.1		9.0		7.9		0		8.3	12.1
344.0	7.2		10.4		12.9		10.3		20.6		12.6		4.4		7.9		10.8	12.1
358.0	3.7		0.1		0		0.1		0		0		3.5		0		0.9	11.3
363.0	6.8		9.6		0.7		8.3		2.3		8.4		2.9		1.7		5.1	11.3
367.0	11.8		8.2		0.1		7.9		8.3		10.0		9.4		0		7.0	10.9
372.0	8.9		6.2		6.2		9.1		7.5		7.5		9.2		1.8		7.1	15.7
375.0	1.2		12.6		3.1		5.4		4.9		5.9		6.2		2.6		5.2	19.1
377.5	6.4		14.2		12.5		12.4		6.0		14.0		10.6		8.6		10.6	20.3

RSRM-1A Aft Cylinder Insulation Performance (Cont'd)

Table 12 (Cont'd)

RSRM 1-A Aft Cylinder
PREFIRE MEASUREMENTS

STATION	DEGREE LOCATION																		STANDARD	
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MIN.	MEDIAN	DEVIATION	MDT
56.0	3.533	3.624	3.619	3.595	3.606	3.472	3.522	3.494	3.624	3.675	3.430	3.437	3.413	3.656	3.606	3.475	3.413	3.564	0.087	2.790
68.0	2.608	2.672	2.739	2.674	2.708	3.972	2.670	2.499	2.909	3.477	2.930	2.998	2.720	3.057	2.804	3.427	2.499	2.772	0.391	2.200
72.0	2.240	2.130	2.154	2.126	2.132	2.159	2.096	2.161	2.148	2.437	2.264	2.292	2.152	2.218	2.283	2.141	2.096	2.157	0.088	2.000
75.0	1.860	1.856	1.954	1.805	1.819	1.982	1.982	2.020	2.071	1.996	2.013	1.947	1.956	2.001	2.117	1.902	1.805	1.969	0.088	1.800
78.0	1.607	1.605	1.639	1.742	1.672	1.686	1.691	1.670	1.616	1.851	1.684	1.696	1.664	1.702	1.775	1.672	1.605	1.678	0.063	1.600
81.0	1.471	1.501	1.485	1.483	1.502	1.503	1.528	1.491	1.524	1.571	1.476	1.517	1.491	1.532	1.575	1.488	1.471	1.502	0.031	1.400
85.0	1.503	1.532	1.736	1.523	1.512	1.583	1.530	1.537	1.560	1.536	1.528	1.533	1.532	1.512	1.767	1.515	1.503	1.532	0.078	1.300
90.0	1.425	1.406	1.445	1.482	1.436	1.433	1.417	1.428	1.436	1.429	1.377	1.415	1.399	1.411	1.372	1.383	1.372	1.421	0.028	1.265
98.0	1.432	1.401	1.427	1.424	1.402	1.385	1.455	1.388	1.435	1.463	1.352	1.412	1.418	1.465	1.406	1.422	1.352	1.420	0.030	1.135
105.8	1.135		1.124		1.127		1.157		1.123		1.107		1.130		1.127		1.107	1.127	0.014	1.080
116.0	1.127		1.112		1.103		1.139		1.082		1.067		1.085		1.071		1.067	1.094	0.026	1.050
124.5	1.086		1.084		1.090		1.163		1.096		1.140		1.099		1.083		1.083	1.093	0.030	1.030
133.0	1.061		1.122		1.081		1.096		1.120		1.179		1.148		1.081		1.061	1.108	0.039	0.980
145.5	0.954		0.976		1.001		0.980		0.975		1.001		1.018		0.963		0.954	0.978	0.021	0.930
158.5	0.914		0.940		0.963		0.936		0.945		0.969		0.958		0.915		0.914	0.942	0.021	0.880
168.3	1.336		1.344		0.964		0.976		1.023		1.033		1.045		0.977		0.964	1.028	0.159	0.850
177.7	1.455		1.494		1.494		1.470		1.483		1.464		1.475		1.468		1.455	1.473	0.014	1.000
192.5	0.875		0.899		0.934		0.931		0.919		0.898		0.946		0.921		0.875	0.920	0.023	0.780
202.5	0.732		0.740		0.745		0.762		0.758		0.753		0.760		0.750		0.732	0.752	0.010	0.730
214.0	0.707		0.709		0.708		0.725		0.722		0.701		0.721		0.715		0.701	0.712	0.009	0.700
227.3	0.776		0.773		0.740		0.769		0.835		0.813		0.775		0.783		0.740	0.775	0.029	0.650
238.3	0.647		0.647		0.635		0.645		0.653		0.649		0.646		0.642		0.635	0.647	0.005	0.530
250.0	0.557		0.555		0.554		0.563		0.570		0.567		0.576		0.553		0.553	0.560	0.008	0.550
267.0	0.513		0.532		0.512		0.526		0.523		0.524		0.526		0.509		0.509	0.524	0.008	0.500
283.9	0.492		0.510		0.508		0.482		0.467		0.512		0.465		0.492		0.465	0.492	0.019	0.450
299.1	1.541		1.066		1.071		1.017		1.046		1.027		1.021		1.010		1.010	1.036	0.180	0.670
322.0	0.408		0.558		0.411		0.408		0.410		0.418		0.423		0.405		0.405	0.411	0.052	0.380
339.0	0.405		0.557		0.409		0.405		0.407		0.419		0.418		0.402		0.402	0.408	0.053	0.380
344.0	0.449		0.467		0.495		0.453		0.621		0.462		0.456		0.456		0.449	0.459	0.058	0.380
358.0	0.408		0.407		0.413		0.407		0.406		0.416		0.409		0.405		0.405	0.407	0.004	0.380
363.0	0.512		0.498		0.522		0.527		0.496		0.489		0.493		0.491		0.489	0.497	0.015	0.380
367.0	0.459		0.452		0.455		0.447		0.449		0.460		0.461		0.455		0.447	0.455	0.005	0.380
372.0	0.506		0.445		0.457		0.524		0.456		0.463		0.510		0.445		0.445	0.460	0.032	0.400
375.0	0.513		0.688		0.560		0.559		0.546		0.548		0.565		0.566		0.513	0.560	0.051	0.480
377.5	0.750		0.877		0.825		0.825		0.632		0.849		0.808		0.825		0.632	0.825	0.077	0.530

RSRM-1A Aft Cylinder Insulation Performance (Cont'd)

Table 12 (Cont'd)

POSTFIRE MEASUREMENTS

STATION	DEGREE LOCATION																		STANDARD
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	MEDIAN	DEVIATION
56.0	2.605	2.761	2.642	2.589	2.696	2.669	2.787	2.510	2.658	2.785	2.815	2.718	2.644	2.887	2.850	2.739	2.510	2.707	0.102
68.0	2.177	2.159	2.289	2.094	2.083	2.665	2.273	1.997	2.259	2.219	2.173	2.366	2.232	2.274	2.190	2.272	1.997	2.226	0.147
72.0	1.734	1.746	1.712	1.745	1.734	1.740	1.648	1.567	1.661	1.776	1.717	1.847	1.720	1.737	1.671	1.663	1.567	1.727	0.063
75.0	1.478	1.475	1.597	1.461	1.485	1.570	1.483	1.449	1.561	1.659	1.512	1.696	1.493	1.540	1.556	1.478	1.449	1.503	0.072
78.0	1.277	1.236	1.295	1.226	1.241	1.328	1.232	1.187	1.193	1.396	1.287	1.411	1.111	1.282	1.235	1.222	1.111	1.238	0.076
81.0	1.102	1.059	1.159	1.082	1.086	1.165	1.143	1.085	1.158	1.287	1.105	1.360	1.161	1.148	1.115	1.114	1.059	1.129	0.078
85.0	1.102	1.116	1.173	1.099	1.143	1.154	1.148	1.149	1.189	1.213	1.155	1.341	1.124	1.163	1.125	1.099	1.099	1.149	0.059
90.0	1.017	0.973	1.029	1.064	1.031	1.011	1.009	1.006	1.052	1.117	1.033	1.184	1.026	1.025	0.960	1.037	0.960	1.028	0.053
98.0	1.043	0.965	0.977	1.055	1.008	1.126	1.050	1.009	1.040	1.105	0.961	1.049	1.060	1.037	1.043	1.052	0.961	1.043	0.045
105.8	0.768		0.691		0.696		0.781		0.761		0.695		0.702		0.711		0.691	0.707	0.038
116.0	0.740		0.682		0.692		0.758		0.726		0.715		0.734		0.666		0.666	0.720	0.032
124.5	0.702		0.680		0.682		0.727		0.756		0.764		0.694		0.696		0.680	0.699	0.033
133.0	0.721		0.741		0.736		0.711		0.830		0.829		0.731		0.736		0.711	0.736	0.047
145.5	0.548		0.572		0.588		0.582		0.584		0.562		0.562		0.544		0.544	0.567	0.017
158.5	0.546		0.582		0.580		0.557		0.582		0.582		0.558		0.610		0.546	0.581	0.020
168.3	0.733		0.752		0.721		0.726		0.720		0.732		0.681		0.709		0.681	0.724	0.021
177.7	1.110		1.243		1.058		1.051		1.085		1.048		1.052		1.049		1.048	1.055	0.067
192.5	0.566		0.602		0.612		0.597		0.617		0.582		0.596		0.554		0.554	0.597	0.022
202.5	0.475		0.473		0.448		0.470		0.480		0.464		0.435		0.406		0.406	0.467	0.025
214.0	0.449		0.428		0.450		0.439		0.453		0.423		0.423		0.432		0.423	0.436	0.012
227.3	0.471		0.520		0.472		0.495		0.537		0.498		0.495		0.483		0.471	0.495	0.023
238.3	0.439		0.521		0.396		0.410		0.408		0.373		0.387		0.379		0.373	0.402	0.048
250.0	0.364		0.372		0.343		0.340		0.337		0.365		0.318		0.290		0.290	0.342	0.027
267.0	0.401		0.423		0.378		0.374		0.352		0.327		0.370		0.381		0.327	0.376	0.029
283.9	0.327		0.336		0.317		0.337		0.328		0.323		0.308		0.320		0.308	0.325	0.010
299.1	0.885		0.844		0.832		0.846		0.844		0.851		0.860		0.757		0.757	0.845	0.037
322.0	0.289		0.303		0.300		0.294		0.303		0.310		0.305		0.383		0.289	0.303	0.030
339.0	0.302		0.324		0.324		0.321		0.309		0.310		0.323		0.405		0.302	0.322	0.032
344.0	0.362		0.341		0.339		0.328		0.372		0.309		0.403		0.361		0.309	0.351	0.029
358.0	0.366		0.406		0.451		0.406		0.413		0.431		0.369		0.509		0.366	0.410	0.046
363.0	0.435		0.390		0.514		0.433		0.470		0.394		0.460		0.472		0.390	0.448	0.042
367.0	0.330		0.363		0.454		0.361		0.358		0.351		0.358		0.498		0.330	0.360	0.059
372.0	0.366		0.348		0.359		0.381		0.338		0.346		0.365		0.416		0.338	0.362	0.025
375.0	0.490		0.448		0.501		0.456		0.452		0.435		0.446		0.516		0.435	0.454	0.030
377.5	0.620		0.588		0.572		0.573		0.510		0.564		0.593		0.651		0.510	0.581	0.041

RSRM-1A Aft Cylinder Insulation Performance (Cont'd)

Table 12 (Cont'd)

RSRM 1-A Aft Center
COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
3.5	3.89	3.66	4.11	3.75	4.20	2.91	3.84	3.77	2.91	226.0	2.0
11.0	4.94	3.98	2.94	3.23	3.45	2.97	3.23	5.22	2.94	90.0	1.5
23.6	3.65	2.97	2.27	2.70	3.24	2.80	3.75	4.04	2.27	90.0	1.5
30.7	4.69	3.22	2.74	2.69	3.41	3.25	2.72	3.16	2.69	136.0	1.5
36.2	3.76	3.20	3.52	3.29	3.71	3.41	3.76	4.41	3.20	46.0	1.5
39.7	4.53	3.81	5.00	3.81	3.64	3.77	3.87	3.14	3.14	316.0	1.5
44.6	8.37	5.71	6.79	5.37	7.20	5.63	6.00	7.20	5.37	136.0	1.5
48.0	2.38	2.67	1.99	2.48	4.24	2.94	2.23	3.65	1.99	90.0	1.5
71.5	4.47	3.04	4.36	2.74	3.78	8.50	6.07	5.31	2.74	136.0	1.5
126.0	+	+	+	+	3.95	+	+	+	3.95	180.0	1.5
153.5	3.82	5.42	5.65	6.19	9.29	+	8.67	5.42	3.82	0.0	1.5
161.4	2.31	1.51<	1.76<	1.71<	3.47	2.03	3.87	+	1.51	46.0	2.0
214.1	+	+	+	+	+	+	+	+			1.5
280.0	+	+	+	+	+	+	+	+			1.5
298.0	+	+	+	+	+	+	+	+			1.5
307.8	+	+	+	+	+	+	+	+			1.5
311.8	+	+	+	+	+	+	+	+			1.5
314.0	+	+	+	+	+	+	+	+			1.5

SEGMENT MINIMUM = 1.51 AT THE 161.4 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE
3.5	4.95	4.66	5.41	4.71	5.19	3.80	4.91	4.72	3.80	226.0
11.0	5.23	4.22	3.23	3.52	3.72	3.34	3.69	5.60	3.23	90.0
23.6	4.28	3.49	2.85	3.15	3.82	3.32	4.29	4.78	2.85	90.0
30.7	5.27	3.62	3.07	3.02	3.89	3.69	3.13	3.70	3.02	136.0
36.2	4.90	4.01	4.30	3.92	4.56	4.37	4.75	5.50	3.92	136.0
39.7	5.12	4.46	5.70	4.21	4.14	4.40	4.46	3.72	3.72	316.0
44.6	8.98	6.06	7.19	5.60	7.68	6.08	6.62	7.56	5.60	136.0
48.0	3.46	3.78	2.81	3.46	6.06	4.27	3.26	5.13	2.81	90.0
71.5	5.00	3.32	4.97	3.02	4.22	9.65	6.89	5.81	3.02	136.0
126.0	+	+	+	+	4.32	+	+	+	4.32	180.0
153.5	4.65	6.79	7.04	7.38	11.71	+	10.73	6.67	4.65	0.0
161.4	6.26	4.12	4.74	4.72	9.25	5.30	10.00	+	4.12	46.0
214.1	+	+	+	+	+	+	+	+		
280.0	+	+	+	+	+	+	+	+		
298.0	+	+	+	+	+	+	+	+		
307.8	+	+	+	+	+	+	+	+		
311.8	+	+	+	+	+	+	+	+		
314.0	+	+	+	+	+	+	+	+		

SEGMENT MINIMUM = 2.81 AT THE 48.0 INCH STATION.
A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1A Aft Center Segment Insulation Performance

Table 13

RSRM 1-A Aft Center
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION
3.5	0.545	0.579	0.516	0.566	0.505	0.728	0.552	0.562	0.728	0.569	0.557	0.069
11.0	0.385	0.477	0.647	0.588	0.551	0.640	0.589	0.364	0.647	0.530	0.570	0.110
23.6	0.255	0.313	0.409	0.345	0.287	0.332	0.248	0.230	0.409	0.302	0.300	0.060
30.7	0.160	0.233	0.274	0.279	0.220	0.231	0.276	0.237	0.279	0.239	0.235	0.039
36.2	0.149	0.175	0.159	0.170	0.151	0.164	0.149	0.127	0.175	0.156	0.155	0.015
39.7	0.095	0.113	0.086	0.113	0.118	0.114	0.111	0.137	0.137	0.111	0.113	0.015
44.6	0.043	0.063	0.053	0.067	0.050	0.064	0.060	0.050	0.067	0.056	0.056	0.008
48.0	0.121<	0.108<	0.145<	0.116<	0.068	0.098<	0.129<	0.079	0.145	0.108	0.112	0.026
71.5	0.038	0.056	0.039	0.062	0.045	0.020	0.028	0.032	0.062	0.040	0.038	0.014
126.0	0	0	0	0	0.038	0	0	0	0.038	0.005	0.000	0.013
153.5	0.034	0.024	0.023	0.021	0.014	0	0.015	0.024	0.034	0.019	0.022	0.010
161.4	0.102<	0.156<	0.134<	0.138<	0.068	0.116<	0.061	0	0.156	0.097	0.109	0.051
214.1	0	0	0	0	0	0	0	0				
280.0	0	0	0	0	0	0	0	0				
298.0	0	0	0	0	0	0	0	0				
307.8	0	0	0	0	0	0	0	0				
311.8	0	0	0	0	0	0	0	0				
314.0	0	0	0	0	0	0	0	0				

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVERAGE	EXPOSURE TIME
3.5	4.9	5.2	4.6	5.1	4.5	6.5	4.9	5.0	5.1	111.9
11.0	4.0	4.9	6.7	6.1	5.7	6.6	6.1	3.7	5.5	97.1
23.6	3.9	4.8	6.2	5.3	4.4	5.1	3.8	3.5	4.6	65.6
30.7	3.4	4.9	5.8	5.9	4.7	4.9	5.8	5.0	5.0	47.3
36.2	4.6	5.4	4.9	5.2	4.7	5.1	4.6	3.9	4.8	32.4
39.7	4.3	5.1	3.9	5.1	5.3	5.2	5.0	6.2	5.0	22.1
44.6	3.6	5.3	4.5	5.6	4.2	5.4	5.0	4.2	4.7	11.9
48.0	10.8	9.6	12.9	10.4	6.1	8.8	11.5	7.1	9.6	11.2
71.5	3.8	5.5	3.9	6.1	4.5	2.0	2.8	3.2	4.0	10.1
126.0	0	0	0	0	4.4	0	0	0	0.5	8.7
153.5	4.4	3.1	3.0	2.7	1.8	0	1.9	3.1	2.5	7.7
161.4	10.3	15.8	13.5	13.9	6.9	11.7	6.2	0	9.8	9.9
214.1	0	0	0	0	0	0	0	0		6.0
280.0	0	0	0	0	0	0	0	0		3.4
298.0	0	0	0	0	0	0	0	0		2.8
307.8	0	0	0	0	0	0	0	0		2.1
311.8	0	0	0	0	0	0	0	0		2.0
314.0	0	0	0	0	0	0	0	0		0.6

RSRM-1A Aft Center Segment Insulation Performance (Cont'd)

Table 13 (Cont'd)

RSRM 1-A Aft Center
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION	MDT
3.5	2.697	2.697	2.793	2.665	2.619	2.768	2.712	2.654	2.619	2.697	0.058	2.120
11.0	2.014	2.014	2.090	2.069	2.052	2.136	2.176	2.037	2.014	2.061	0.058	1.900
23.6	1.091	1.091	1.164	1.087	1.096	1.101	1.064	1.100	1.064	1.094	0.029	0.930
30.7	0.843	0.843	0.841	0.842	0.855	0.852	0.863	0.878	0.841	0.848	0.013	0.750
36.2	0.730	0.702	0.683	0.667	0.689	0.716	0.708	0.698	0.667	0.700	0.020	0.560
39.7	0.486	0.504	0.490	0.476	0.489	0.502	0.495	0.510	0.476	0.493	0.011	0.430
44.6	0.386	0.382	0.381	0.375	0.384	0.389	0.397	0.378	0.375	0.383	0.007	0.360
48.0	0.419	0.408	0.408	0.401	0.412	0.418	0.421	0.405	0.401	0.410	0.007	0.288
71.5	0.190	0.186	0.194	0.187	0.190	0.193	0.193	0.186	0.186	0.190	0.003	0.170
126.0	0.162	0.154	0.162	0.165	0.164	0.165	0.165	0.160	0.154	0.163	0.004	0.150
153.5	0.158	0.163	0.162	0.155	0.164	0.163	0.161	0.160	0.155	0.162	0.003	0.130
161.4	0.639	0.642	0.635	0.652	0.629	0.615	0.610	0.522	0.522	0.632	0.041	0.236
214.1	0.130	0.130	0.130	0.133	0.131	0.133	0.130	0.139	0.130	0.131	0.003	0.130
280.0	0.108	0.108	0.103	0.100	0.106	0.110	0.105	0.109	0.100	0.107	0.003	0.090
298.0	0.107	0.092	0.221	0.216	0.220	0.222	0.220	0.220	0.092	0.220	0.056	0.090
307.8	0.109	0.103	0.109	0.108	0.109	0.107	0.106	0.110	0.103	0.109	0.002	0.090
311.8	0.109	0.104	0.113	0.106	0.110	0.108	0.107	0.108	0.104	0.108	0.003	0.090
314.0	0.110	0.103	0.110	0.110	0.110	0.109	0.109	0.104	0.103	0.109	0.003	0.090

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION
3.5	2.152	2.118	2.277	2.099	2.114	2.040	2.160	2.092	2.040	2.116	0.070
11.0	1.629	1.537	1.443	1.481	1.501	1.496	1.587	1.673	1.443	1.519	0.079
23.6	0.836	0.778	0.755	0.742	0.809	0.769	0.816	0.870	0.742	0.794	0.044
30.7	0.683	0.610	0.567	0.563	0.635	0.621	0.587	0.641	0.563	0.616	0.041
36.2	0.581	0.527	0.524	0.497	0.538	0.552	0.559	0.571	0.497	0.545	0.028
39.7	0.391	0.391	0.404	0.363	0.371	0.388	0.384	0.373	0.363	0.386	0.013
44.6	0.343	0.319	0.328	0.308	0.334	0.325	0.337	0.328	0.308	0.328	0.011
48.0	0.298	0.300	0.263	0.285	0.344	0.320	0.292	0.326	0.263	0.299	0.026
71.5	0.152	0.130	0.155	0.125	0.145	0.173	0.165	0.154	0.125	0.153	0.016
126.0	0.196	0.176	0.205	0.176	0.126	0.210	0.197	0.266	0.126	0.197	0.039
153.5	0.124	0.139	0.139	0.134	0.150	L	0.146	0.136	0.124	0.139	0.012
161.4	0.537	0.486	0.501	0.514	0.561	0.499	0.549	0.552	0.486	0.525	0.028
214.1	L	L	L	L	L	L	L	L	0.130	0.131	0.003
280.0	L	L	L	L	L	L	L	L	0.100	0.107	0.003
298.0	L	L	L	L	L	L	L	L	0.092	0.220	0.056
307.8	L	L	L	L	L	L	L	L	0.103	0.109	0.002
311.8	L	L	L	L	L	L	L	L	0.104	0.108	0.003
314.0	L	L	L	L	L	L	L	L	0.103	0.109	0.003

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

RSRM-1A Aft Center Segment Insulation Performance (Cont'd)

Table 13 (Cont'd)

RSRM 1-A Forward Center
COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
3.5	17.24	21.63	19.45	15.59	+	29.44	+	20.58	15.59	136.0	2.0
11.0	20.65	45.24	31.67	+	+	+	13.77	+	13.77	270.0	1.5
23.6	3.75	2.66	3.07	2.42	3.08	2.92	2.50	2.54	2.42	136.0	1.5
30.7	6.76	9.15	7.50	4.72	8.52	6.64	8.24	5.07	4.72	136.0	1.5
36.2	15.14	16.97	11.91	2.79	9.82	6.83	12.17	9.82	2.79	136.0	1.5
39.7	17.92	7.17	28.67	6.23	15.36	61.43	43.00	7.17	6.23	136.0	1.5
44.6	+	+	51.43	15.65	30.00	30.00	+	+	15.65	136.0	1.5
48.0	+	4.36	48.00	7.02	5.43	9.60	8.00	5.88	4.36	46.0	1.5
71.5	28.33	+	13.08	28.33	2.98	3.70	7.08	28.33	2.98	180.0	1.5
126.0	3.75	4.29	+	3.00	5.00	3.95	+	+	3.00	136.0	1.5
153.5	43.33	+	+	+	+	+	+	+	43.33	0.0	1.5
161.4	0.97<	1.89<	3.58	2.51	12.42	6.56	2.25	4.72	0.97	0.0	2.0
214.1	+	+	+	1.60	1.94	1.29<	+	+	1.29	226.0	1.5
280.0	+	+	+	+	+	+	+	+			1.5
298.0	+	+	+	+	+	+	+	+			1.5
307.8	+	+	+	+	+	+	+	+			1.5
311.8	+	+	+	+	+	+	+	+			1.5
314.0	+	+	+	+	+	+	+	+			1.5

SEGMENT MINIMUM = 0.97 AT THE 161.4 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE
3.5	19.79	25.76	22.31	17.96	+	31.82	+	23.03	17.96	136.0
11.0	22.77	48.10	34.85	+	+	+	15.39	+	15.39	270.0
23.6	4.58	3.45	3.86	3.38	3.87	3.88	3.30	3.39	3.30	270.0
30.7	7.72	9.91	8.31	5.51	9.19	7.66	9.33	6.20	5.51	136.0
36.2	18.76	20.36	14.62	4.15	11.89	8.51	14.50	11.95	4.15	136.0
39.7	18.79	7.77	29.47	6.64	15.93	63.43	44.50	7.88	6.64	136.0
44.6	+	+	51.57	15.83	30.25	30.25	+	+	15.83	136.0
48.0	+	6.17	60.00	9.12	7.89	13.17	11.53	8.65	6.17	46.0
71.5	31.50	+	14.54	36.50	3.98	5.04	7.92	32.00	3.98	180.0
126.0	5.88	5.71	+	4.64	6.90	5.84	+	+	4.64	136.0
153.5	48.00	+	+	+	+	+	+	+	48.00	0.0
161.4	3.13	5.36	10.09	7.06	34.53	19.22	6.37	12.52	3.13	0.0
214.1	+	+	+	3.12	3.48	2.44	+	+	2.44	226.0
280.0	+	+	+	+	+	+	+	+		
298.0	+	+	+	+	+	+	+	+		
307.8	+	+	+	+	+	+	+	+		
311.8	+	+	+	+	+	+	+	+		
314.0	+	+	+	+	+	+	+	+		

SEGMENT MINIMUM = 2.44 AT THE 214.1 INCH STATION.
A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1A Forward Center Segment Insulation Performance

Table 14

RSRM 1-A Forward Center
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION
3.5	0.123	0.098	0.109	0.136	0	0.072	0.003	0.103	0.136	0.080	0.101	0.052
11.0	0.092	0.042	0.060	0	0	0	0.138	0	0.138	0.042	0.021	0.052
23.6	0.248	0.350	0.303	0.385	0.302	0.319	0.372	0.366	0.385	0.331	0.335	0.046
30.7	0.111	0.082	0.100	0.159	0.088	0.113	0.091	0.148	0.159	0.111	0.106	0.028
36.2	0.037	0.033	0.047	0.201	0.057	0.082	0.046	0.057	0.201	0.070	0.052	0.055
39.7	0.024	0.060	0.015	0.069	0.028	0.007	0.010	0.060	0.069	0.034	0.026	0.025
44.6	0	0	0.007	0.023	0.012	0.012	0	0	0.023	0.007	0.004	0.008
48.0	0.002	0.066	0.006	0.041	0.053	0.030	0.036	0.049	0.066	0.035	0.038	0.022
71.5	0.006	0	0.013	0.006	0.057	0.046	0.024	0.006	0.057	0.020	0.010	0.021
126.0	0.040	0.035	0.001	0.050	0.030	0.038	0	0	0.050	0.024	0.032	0.021
153.5	0.003	0	0	0	0	0	0	0	0.003	0.000	0.000	0.001
161.4	0.244<	0.125<	0.066	0.094<	0.019	0.036	0.105<	0.050	0.244	0.092	0.080	0.071
214.1	0	0	0	0.081<	0.067<	0.101<	0	0	0.101	0.031	0.000	0.044
280.0	0	0	0	0	0	0	0	0				
298.0	0	0	0	0	0	0	0	0				
307.8	0	0	0	0	0	0	0	0				
311.8	0	0	0	0	0	0	0	0				
314.0	0	0	0	0	0	0	0	0				

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVERAGE	EXPOSURE TIME
3.5	1.1	0.9	1.0	1.2	0	0.6	0	0.9	0.7	112.1
11.0	0.9	0.4	0.6	0	0	0	1.4	0	0.4	97.5
23.6	3.7	5.3	4.6	5.8	4.6	4.8	5.6	5.5	5.0	66.2
30.7	2.3	1.7	2.1	3.3	1.8	2.4	1.9	3.1	2.3	47.7
36.2	1.1	1.0	1.4	6.1	1.7	2.5	1.4	1.7	2.1	33.0
39.7	1.1	2.6	0.7	3.0	1.2	0.3	0.4	2.6	1.5	22.7
44.6	0	0	0.6	1.8	0.9	0.9	0	0	0.5	12.7
48.0	0.2	5.5	0.5	3.4	4.4	2.5	3.0	4.1	2.9	12.0
71.5	0.6	0	1.2	0.6	5.2	4.2	2.2	0.6	1.8	10.9
126.0	4.2	3.7	0.1	5.3	3.2	4.0	0	0	2.6	9.5
153.5	0.3	0	0	0	0	0	0	0	0.0	8.7
161.4	22.8	11.7	6.2	8.8	1.8	3.4	9.8	4.7	8.6	10.7
214.1	0	0	0	11.3	9.3	14.0	0	0	4.3	7.2
280.0	0	0	0	0	0	0	0	0		4.2
298.0	0	0	0	0	0	0	0	0		4.0
307.8	0	0	0	0	0	0	0	0		3.5
311.8	0	0	0	0	0	0	0	0		3.4
314.0	0	0	0	0	0	0	0	0		0.6

RSRM-1A Forward Center Segment Insulation Performance (Cont'd)

Table 14 (Cont'd)

RSRM 1-A Forward Center
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION	MDT
3.5	2.434	2.524	2.432	2.443	2.347	2.291	2.230	2.372	2.230	2.402	0.094	2.120
11.0	2.095	2.020	2.091	2.141	2.012	2.080	2.124	1.983	1.983	2.086	0.057	1.900
23.6	1.135	1.208	1.169	1.302	1.168	1.237	1.226	1.240	1.135	1.217	0.053	0.930
30.7	0.857	0.813	0.831	0.876	0.809	0.866	0.849	0.918	0.809	0.853	0.036	0.750
36.2	0.694	0.672	0.687	0.835	0.678	0.698	0.667	0.681	0.667	0.684	0.055	0.560
39.7	0.451	0.466	0.442	0.458	0.446	0.444	0.445	0.473	0.442	0.449	0.011	0.430
44.6	0.366	0.360	0.361	0.364	0.363	0.363	0.365	0.364	0.360	0.363	0.002	0.360
48.0	0.349	0.407	0.360	0.374	0.418	0.395	0.415	0.424	0.349	0.401	0.028	0.288
71.5	0.189	0.194	0.189	0.219	0.227	0.232	0.190	0.192	0.189	0.193	0.019	0.170
126.0	0.235	0.200	0.171	0.232	0.207	0.222	0.206	0.248	0.171	0.215	0.024	0.150
153.5	0.144	0.142	0.143	0.133	0.138	0.153	0.141	0.141	0.133	0.142	0.006	0.130
161.4	0.763	0.670	0.666	0.664	0.656	0.692	0.669	0.626	0.626	0.668	0.040	0.236
214.1	0.271	0.130	0.254	0.253	0.233	0.246	0.132	0.362	0.130	0.250	0.075	0.130
280.0	0.090	0.112	0.111	0.110	0.106	0.109	0.116	0.113	0.090	0.111	0.008	0.090
298.0	0.090	0.109	0.114	0.230	0.103	0.114	0.104	0.108	0.090	0.109	0.045	0.090
307.8	0.090	0.115	0.107	0.110	0.107	0.103	0.114	0.112	0.090	0.109	0.008	0.090
311.8	0.116	0.093	0.108	0.108	0.106	0.107	0.110	0.113	0.093	0.108	0.007	0.090
314.0	0.093	0.093	0.108	0.107	0.103	0.105	0.117	0.113	0.093	0.106	0.009	0.090

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION
3.5	2.311	2.426	2.323	2.307	2.758	2.219	2.227	2.269	2.219	2.309	0.175
11.0	2.003	1.978	2.031	2.275	2.217	2.192	1.986	2.107	1.978	2.069	0.116
23.6	0.887	0.858	0.866	0.917	0.866	0.918	0.854	0.874	0.854	0.870	0.025
30.7	0.746	0.731	0.731	0.717	0.721	0.753	0.758	0.770	0.717	0.738	0.019
36.2	0.657	0.639	0.640	0.634	0.621	0.616	0.621	0.624	0.616	0.629	0.014
39.7	0.427	0.406	0.427	0.389	0.418	0.437	0.435	0.413	0.389	0.423	0.016
44.6	L	L	0.354	0.341	0.351	0.351	L	L	0.341	0.357	0.009
48.0	0.347	0.341	0.354	0.333	0.365	0.365	0.379	0.375	0.333	0.360	0.016
71.5	0.183	L	0.176	0.213	0.170	0.186	0.166	0.186	0.166	0.185	0.015
126.0	0.195	0.165	0.170	0.182	0.177	0.184	L	L	0.165	0.183	0.027
153.5	0.141	L	L	L	L	L	L	L	0.133	0.141	0.006
161.4	0.519	0.545	0.600	0.570	0.637	0.656	0.564	0.576	0.519	0.573	0.046
214.1	L	L	L	0.172	0.166	0.145	L	L	0.130	0.169	0.083
280.0	L	L	L	L	L	L	L	L	0.090	0.111	0.008
298.0	L	L	L	L	L	L	L	L	0.090	0.109	0.045
307.8	L	L	L	L	L	L	L	L	0.090	0.109	0.008
311.8	L	L	L	L	L	L	L	L	0.093	0.108	0.007
314.0	L	L	L	L	L	L	L	L	0.093	0.106	0.009

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

RSRM-1A Forward Center Segment Insulation Performance (Cont'd)

Table 14 (Cont'd)

RSRM 1-A Forward Segment Star Tip

COMPLIANCE SAFETY FACTOR (CSF)									ACTUAL SAFETY FACTOR (ASF)							
STATION	DEGREE LOCATION							REQUIRED	STATION	DEGREE LOCATION						
(IN)	90.0	154.0	222.0	286.0	352.0	MINIMUM	PLANE	SAFETY FACTOR	(IN)	90.0	154.0	222.0	286.0	352.0	MINIMUM	PLANE
3.5	9.02	7.91	11.46	9.91	10.98	7.91	154.0	2.0	3.5	11.77	10.31	15.15	13.34	14.16	10.31	154.0
13.0	7.30	32.50	28.26	13.00	16.67	7.30	90.0	1.5	13.0	8.98	36.40	32.61	14.80	19.05	8.98	90.0
23.0	+	+	+	+	+			1.5	23.0	+	+	+	+	+		
27.0	+	+	+	+	+			1.5	27.0	+	+	+	+	+		
30.7	+	+	+	+	+			1.5	30.7	+	+	+	+	+		
34.2	+	+	+	+	+			1.5	34.2	+	+	+	+	+		
37.7	+	+	+	+	+			1.5	37.7	+	+	+	+	+		
41.2	+	+	+	+	+			1.5	41.2	+	+	+	+	+		
44.0	+	+	+	+	+			1.5	44.0	+	+	+	+	+		
94.7	+	+	+	+	+			1.5	94.7	+	+	+	+	+		
142.0	+	+	+	+	+			1.5	142.0	+	+	+	+	+		
145.7	46.80	+	13.76	+	13.76	13.76	222.0	1.5	145.7	52.60	+	14.76	+	15.12	14.76	222.0
148.5	+	5.87	23.00	19.71	46.00	5.87	154.0	1.5	148.5	+	7.13	24.08	21.57	49.67	7.13	154.0
152.0	7.04	79.25	1.45<	1.77	1.74	1.45	222.0	1.5	152.0	7.82	87.75	2.47	2.95	2.98	2.47	222.0
155.0	2.25	7.66	3.79	3.30	6.79	2.25	90.0	1.5	155.0	4.19	10.79	5.65	5.39	9.70	4.19	90.0
162.0	4.03	4.31	5.93	5.54	12.00	4.03	90.0	2.0	162.0	6.18	6.26	8.48	8.00	18.21	6.18	90.0
173.0	5.93	2.49	1.62	3.05	4.59	1.62	222.0	1.5	173.0	7.86	3.64	2.56	3.93	5.61	2.56	222.0
175.5	3.20	3.26	3.51	4.00	4.99	3.20	90.0	1.5	175.5	3.97	3.76	4.02	4.62	5.74	3.76	154.0
187.0	3.12	3.02	2.96	2.79	2.99	2.79	286.0	1.5	187.0	3.30	3.06	2.99	2.92	3.03	2.92	286.0
199.0	2.49	3.83	3.80	3.23	3.92	2.49	90.0	1.5	199.0	2.79	3.91	3.91	3.33	4.01	2.79	90.0
215.0	2.23	3.15	2.30	2.16	3.65	2.16	286.0	1.5	215.0	2.65	3.42	2.64	2.66	3.85	2.64	222.0
224.0	3.03	4.10	3.21	3.09	3.44	3.03	90.0	1.5	224.0	3.34	4.22	3.35	3.47	3.69	3.34	90.0
230.0	2.87	3.51	2.93	4.28	2.99	2.87	90.0	1.5	230.0	2.99	3.54	2.98	4.34	3.02	2.98	222.0
236.0	2.50	3.44	2.83	4.41	2.90	2.50	90.0	1.5	236.0	3.06	3.46	2.91	4.41	3.03	2.91	222.0
240.0	2.33	3.34	2.56	4.99	2.73	2.33	90.0	1.5	240.0	2.86	3.38	2.63	5.06	2.85	2.63	222.0
251.0	2.58	3.66	2.26	3.28	2.18	2.18	352.0	1.5	251.0	3.16	4.60	2.91	3.69	3.05	2.91	222.0
263.0	2.64	3.59	2.85	4.34	4.37	2.64	90.0	1.5	263.0	2.75	3.72	2.90	4.44	4.46	2.75	90.0
280.0	2.40	4.81	2.88	3.10	5.74	2.40	90.0	1.5	280.0	2.95	5.14	3.27	3.62	6.21	2.95	90.0
293.0	2.29	2.60	2.63	3.59	3.39	2.29	90.0	1.5	293.0	2.80	2.97	2.66	3.73	3.48	2.66	222.0
305.0	1.94	3.57	2.79	3.14	3.67	1.94	90.0	1.5	305.0	2.41	3.69	3.12	3.51	3.88	2.41	90.0
312.0	2.30	9.02	2.06	2.40	2.55	2.06	222.0	1.5	312.0	2.76	9.97	2.48	3.00	2.90	2.48	222.0
321.0	4.12	4.48	3.37	6.75	3.09	3.09	352.0	2.0	321.0	4.35	4.80	3.77	7.12	3.72	3.72	352.0
330.0	4.30	1.79	1.56	2.57	3.36	1.56	222.0	1.5	330.0	6.98	3.26	3.02	4.40	5.91	3.02	222.0
347.0	2.92	2.75	2.50	3.09	2.65	2.50	222.0	1.5	347.0	4.00	3.41	3.27	3.66	3.31	3.27	222.0
359.0	2.21	3.33	1.38<	2.99	4.41	1.38	222.0	1.5	359.0	2.89	3.53	1.88	3.18	4.58	1.88	222.0
371.0	2.27	2.78	1.74	2.50	3.19	1.74	222.0	1.5	371.0	3.04	3.01	2.07	2.71	3.45	2.07	222.0
383.0	4.09	1.78	1.88	2.97	2.41	1.78	154.0	1.5	383.0	4.46	2.35	2.10	3.36	2.76	2.10	222.0
394.0	2.76	2.01	1.71	1.81	3.35	1.71	222.0	1.5	394.0	3.16	2.48	2.18	2.34	3.89	2.18	222.0

SEGMENT MINIMUM = 1.38 AT THE 359.0 INCH STATION

SEGMENT MINIMUM = 1.88 AT THE 359.0 INCH STATION.

A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

Table 15. RSRM-1A Forward Segment Star Tip Insulation Performance

RSRM 1-A Forward Segment Star Tip

STATION	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES										MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND						
	DEGREE LOCATION								STANDARD	STATION	DEGREE LOCATION						EXPOSURE
(IN)	90.0	154.0	222.0	286.0	352.0	MAXIMUM	AVE.	MEDIAN	DEVIATION	(IN)	90.0	154.0	222.0	286.0	352.0	AVERAGE	TIME
3.5	0.235<	0.268<	0.185<	0.214<	0.193<	0.268	0.219	0.214	0.034	3.5	6.9	7.8	5.4	6.3	5.6	6.4	34.2
13.0	0.089	0.020	0.023	0.050	0.039	0.089	0.044	0.039	0.028	13.0	4.0	0.9	1.0	2.3	1.8	2.0	22.1
23.0	0	0	0	0	0					23.0	0	0	0	0	0		7.9
27.0	0	0	0	0	0					27.0	0	0	0	0	0		4.8
30.7	0	0	0	0	0					30.7	0	0	0	0	0		4.8
34.2	0	0	0	0	0					34.2	0	0	0	0	0		4.2
37.7	0	0	0	0	0					37.7	0	0	0	0	0		3.6
41.2	0	0	0	0	0					41.2	0	0	0	0	0		3.6
44.0	0	0	0	0	0					44.0	0	0	0	0	0		3.0
94.7	0	0	0	0	0					94.7	0	0	0	0	0		0.8
142.0	0	0	0	0	0					142.0	0	0	0	0	0		1.0
145.7	0.005	0.002	0.017	0	0.017	0.017	0.008	0.005	0.008	145.7	0.4	0.1	1.2	0	1.2	0.6	13.7
148.5	0	0.047	0.012	0.014	0.006	0.047	0.016	0.012	0.018	148.5	0	2.1	0.5	0.6	0.3	0.7	22.3
152.0	0.045	0.004	0.219<	0.179<	0.182<	0.219	0.126	0.179	0.095	152.0	1.4	0.1	6.8	5.5	5.6	3.9	32.4
155.0	0.160	0.047	0.095	0.109	0.053	0.160	0.093	0.095	0.046	155.0	4.0	1.2	2.4	2.7	1.3	2.3	40.3
162.0	0.125	0.117	0.085	0.091	0.042	0.125	0.092	0.091	0.033	162.0	2.2	2.0	1.5	1.6	0.7	1.6	57.6
173.0	0.092	0.219	0.337<	0.179	0.119	0.337	0.189	0.179	0.096	173.0	1.2	2.8	4.2	2.3	1.5	2.4	79.3
175.5	0.189	0.185	0.172	0.151	0.121	0.189	0.164	0.172	0.028	175.5	2.1	2.1	1.9	1.7	1.4	1.8	88.6
187.0	0.205	0.212	0.216	0.229	0.214	0.229	0.215	0.214	0.009	187.0	2.0	2.1	2.1	2.3	2.1	2.1	101.3
199.0	0.258	0.168	0.169	0.199	0.164	0.258	0.192	0.169	0.040	199.0	2.5	1.7	1.7	2.0	1.6	1.9	101.3
215.0	0.286	0.203	0.278	0.296	0.175	0.296	0.248	0.278	0.055	215.0	2.8	2.0	2.7	2.9	1.7	2.4	101.3
224.0	0.211	0.156	0.199	0.207	0.186	0.211	0.192	0.199	0.022	224.0	2.1	1.5	2.0	2.0	1.8	1.9	101.3
230.0	0.204	0.167	0.200	0.137	0.196	0.204	0.181	0.196	0.028	230.0	2.0	1.6	2.0	1.4	1.9	1.8	101.3
236.0	0.231	0.168	0.204	0.131	0.199	0.231	0.187	0.199	0.038	236.0	2.3	1.7	2.0	1.3	2.0	1.8	101.3
240.0	0.246	0.172	0.224	0.115	0.210	0.246	0.193	0.210	0.051	240.0	2.4	1.7	2.2	1.1	2.1	1.9	101.3
251.0	0.220	0.155	0.251	0.173	0.260	0.260	0.212	0.220	0.047	251.0	2.2	1.5	2.5	1.7	2.6	2.1	101.3
263.0	0.215	0.158	0.199	0.131	0.130	0.215	0.167	0.158	0.039	263.0	2.1	1.6	2.0	1.3	1.3	1.6	101.3
280.0	0.237	0.118	0.197	0.183	0.099	0.237	0.167	0.183	0.057	280.0	2.3	1.2	1.9	1.8	1.0	1.6	101.3
293.0	0.238	0.210	0.208	0.152	0.161	0.238	0.194	0.208	0.036	293.0	2.3	2.1	2.1	1.5	1.6	1.9	101.3
305.0	0.270	0.147	0.188	0.167	0.143	0.270	0.183	0.167	0.052	305.0	2.7	1.5	1.9	1.6	1.4	1.8	101.3
312.0	0.227	0.058	0.254	0.218	0.205	0.254	0.192	0.218	0.077	312.0	2.2	0.6	2.5	2.2	2.0	1.9	101.3
321.0	0.223	0.205	0.272	0.136	0.297	0.297	0.227	0.223	0.063	321.0	2.2	2.0	2.6	1.3	2.9	2.2	103.5
330.0	0.128	0.308	0.353<	0.214	0.164	0.353	0.233	0.214	0.095	330.0	1.3	3.1	3.5	2.1	1.6	2.3	100.9
347.0	0.179	0.190	0.209	0.169	0.197	0.209	0.189	0.190	0.016	347.0	1.8	1.9	2.1	1.7	2.0	1.9	99.4
359.0	0.235	0.156	0.378<	0.174	0.118	0.378	0.212	0.174	0.102	359.0	2.4	1.6	3.8	1.8	1.2	2.1	99.0
371.0	0.229	0.187	0.298	0.208	0.163	0.298	0.217	0.208	0.051	371.0	2.4	2.0	3.2	2.2	1.7	2.3	94.2
383.0	0.125	0.287	0.272	0.172	0.212	0.287	0.214	0.212	0.068	383.0	1.3	3.0	2.8	1.8	2.2	2.2	95.6
394.0	0.182	0.250	0.295<	0.278	0.150	0.295	0.231	0.250	0.063	394.0	1.9	2.6	3.0	2.9	1.5	2.4	97.2

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

Table 15. RSRM-1A Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-A Forward Segment Star Tip

PREFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD	
(IN)	90.0	154.0	222.0	286.0	352.0	MINIMUM	MEDIAN	DEVIATION	MDT
3.5	2.767	2.764	2.802	2.855	2.732	2.732	2.767	0.047	2.120
13.0	0.799	0.728	0.750	0.740	0.743	0.728	0.743	0.027	0.650
23.0	0.655	0.659	0.684	0.644	0.620	0.620	0.655	0.023	0.500
27.0	0.487	0.478	0.580	0.639	0.466	0.466	0.487	0.076	0.450
30.7	0.499	0.468	0.481	0.491	0.587	0.468	0.491	0.047	0.400
34.2	0.532	0.551	0.631	0.523	0.585	0.523	0.551	0.044	0.380
37.7	0.553	0.546	0.557	0.560	0.556	0.546	0.556	0.005	0.330
41.2	0.299	0.284	0.287	0.299	0.294	0.284	0.294	0.007	0.280
44.0	0.302	0.295	0.291	0.290	0.292	0.290	0.292	0.005	0.250
94.7	0.105	0.093	0.107	0.098	0.095	0.093	0.098	0.006	0.090
142.0	0.148	0.148	0.148	0.160	0.151	0.148	0.148	0.005	0.113
145.7	0.263	0.258	0.251	0.267	0.257	0.251	0.258	0.006	0.234
148.5	0.301	0.335	0.289	0.302	0.298	0.289	0.301	0.018	0.276
152.0	0.352	0.351	0.542	0.528	0.542	0.351	0.528	0.102	0.317
155.0	0.670	0.507	0.537	0.588	0.514	0.507	0.537	0.068	0.360
162.0	0.772	0.732	0.721	0.728	0.765	0.721	0.732	0.023	0.504
173.0	0.723	0.798	0.862	0.703	0.667	0.667	0.723	0.079	0.546
175.5	0.751	0.696	0.691	0.698	0.695	0.691	0.696	0.025	0.604
197.0	0.676	0.648	0.646	0.668	0.648	0.646	0.648	0.014	0.640
199.0	0.719	0.657	0.660	0.663	0.658	0.657	0.660	0.027	0.643
215.0	0.757	0.695	0.735	0.788	0.673	0.673	0.735	0.046	0.639
224.0	0.704	0.658	0.667	0.718	0.687	0.658	0.687	0.025	0.639
230.0	0.610	0.591	0.596	0.594	0.591	0.591	0.594	0.008	0.586
236.0	0.706	0.581	0.594	0.578	0.603	0.578	0.594	0.053	0.578
240.0	0.704	0.582	0.590	0.582	0.599	0.582	0.590	0.052	0.574
251.0	0.696	0.713	0.730	0.639	0.792	0.639	0.713	0.055	0.568
263.0	0.592	0.587	0.578	0.581	0.580	0.578	0.581	0.006	0.568
280.0	0.698	0.607	0.645	0.662	0.615	0.607	0.645	0.037	0.568
293.0	0.667	0.623	0.553	0.567	0.560	0.553	0.567	0.049	0.546
305.0	0.652	0.542	0.586	0.586	0.555	0.542	0.586	0.043	0.525
312.0	0.627	0.578	0.629	0.653	0.594	0.578	0.627	0.030	0.523
321.0	0.971	0.985	1.026	0.968	1.104	0.968	0.985	0.057	0.918
330.0	0.893	1.005	1.065	0.941	0.970	0.893	0.970	0.065	0.551
347.0	0.716	0.647	0.684	0.619	0.653	0.619	0.653	0.037	0.523
359.0	0.678	0.551	0.709	0.553	0.540	0.540	0.553	0.081	0.520
371.0	0.696	0.562	0.616	0.564	0.563	0.562	0.564	0.058	0.520
383.0	0.558	0.675	0.570	0.578	0.585	0.558	0.578	0.047	0.511
394.0	0.575	0.620	0.643	0.650	0.583	0.575	0.620	0.034	0.503

Table 15. RSRM-1A Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-A Forward Segment Star Tip
POSTFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD
(IN)	90.0	154.0	222.0	286.0	352.0	MINIMUM	MEDIAN	DEVIATION
3.5	2.532	2.496	2.617	2.641	2.539	2.496	2.539	0.061
13.0	0.710	0.708	0.727	0.690	0.704	0.690	0.708	0.013
23.0	L	L	L	L	L	0.620	0.655	0.023
27.0	L	L	L	L	L	0.466	0.487	0.076
30.7	L	L	L	L	L	0.468	0.491	0.047
34.2	L	L	L	L	L	0.523	0.551	0.044
37.7	L	L	L	L	L	0.546	0.556	0.005
41.2	L	L	L	L	L	0.284	0.294	0.007
44.0	L	L	L	L	L	0.290	0.292	0.005
94.7	L	L	L	L	L	0.093	0.098	0.006
142.0	L	L	L	L	L	0.148	0.148	0.005
145.7	0.258	0.256	0.234	L	0.240	0.234	0.256	0.014
148.5	0.320	0.288	0.277	0.288	0.292	0.277	0.288	0.016
152.0	0.307	0.347	0.323	0.349	0.360	0.307	0.347	0.022
155.0	0.510	0.460	0.442	0.479	0.461	0.442	0.461	0.026
162.0	0.647	0.615	0.636	0.637	0.723	0.615	0.637	0.042
173.0	0.631	0.579	0.525	0.524	0.548	0.524	0.548	0.045
175.5	0.562	0.511	0.519	0.547	0.574	0.511	0.547	0.027
187.0	0.471	0.436	0.430	0.439	0.434	0.430	0.436	0.017
199.0	0.461	0.489	0.491	0.464	0.494	0.461	0.489	0.016
215.0	0.471	0.492	0.457	0.492	0.498	0.457	0.492	0.017
224.0	0.493	0.502	0.468	0.511	0.501	0.468	0.501	0.016
230.0	0.406	0.424	0.396	0.457	0.395	0.395	0.406	0.026
236.0	0.475	0.413	0.390	0.447	0.404	0.390	0.413	0.035
240.0	0.458	0.410	0.366	0.467	0.389	0.366	0.410	0.044
251.0	0.476	0.558	0.479	0.466	0.532	0.466	0.479	0.040
263.0	0.377	0.429	0.379	0.450	0.450	0.377	0.429	0.037
280.0	0.461	0.489	0.448	0.479	0.516	0.448	0.479	0.026
293.0	0.429	0.413	0.345	0.415	0.399	0.345	0.413	0.033
305.0	0.382	0.395	0.398	0.419	0.412	0.382	0.398	0.015
312.0	0.400	0.520	0.375	0.435	0.389	0.375	0.400	0.058
321.0	0.748	0.780	0.754	0.832	0.807	0.748	0.780	0.036
330.0	0.765	0.697	0.712	0.727	0.806	0.697	0.727	0.044
347.0	0.537	0.457	0.475	0.450	0.456	0.450	0.457	0.036
359.0	0.443	0.395	0.331	0.379	0.422	0.331	0.395	0.043
371.0	0.467	0.375	0.318	0.356	0.400	0.318	0.375	0.056
383.0	0.433	0.388	0.298	0.406	0.373	0.298	0.388	0.051
394.0	0.393	0.370	0.348	0.372	0.433	0.348	0.372	0.032

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUE WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

Table 15. RSRM-1A Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-A Forward Segment Non-star Tip

COMPLIANCE SAFETY FACTOR (CSF)									ACTUAL SAFETY FACTOR (ASF)							
STATION	DEGREE LOCATION							REQUIRED	STATION	DEGREE LOCATION						
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	PLANE	SAFETY FACTOR	(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	PLANE
3.5	8.95	9.26	7.91	8.83	8.31	7.91	206.0	2.0	3.5	12.27	12.23	10.37	11.53	11.01	10.37	206.0
13.0	92.86	27.08	9.70	8.13	7.74	7.74	336.0	1.5	13.0	+	31.58	11.33	10.13	9.58	9.58	336.0
23.0	+	+	+	+	+			1.5	23.0	+	+	+	+	+		
27.0	+	+	+	+	+			1.5	27.0	+	+	+	+	+		
30.7	+	+	+	+	+			1.5	30.7	+	+	+	+	+		
34.2	+	+	+	+	+			1.5	34.2	+	+	+	+	+		
37.7	+	+	+	+	+			1.5	37.7	+	+	+	+	+		
41.2	+	+	+	+	+			1.5	41.2	+	+	+	+	+		
44.0	+	+	+	+	+			1.5	44.0	+	+	+	+	+		
94.7	+	+	+	+	+			1.5	94.7	+	+	+	+	+		
142.0	+	+	+	+	+			1.5	142.0	+	+	+	+	+		
145.7	+	+	+	+	+			1.5	145.7	+	+	+	+	+		
148.5	+	8.12	+	+	+	8.12	140.0	1.5	148.5	+	9.82	+	+	+	9.82	140.0
152.0	79.25	63.40	1.59	31.70	1.73	1.59	206.0	1.5	152.0	83.50	70.20	2.59	35.00	2.99	2.59	206.0
155.0	3.79	13.85	+	3.43	4.39	3.43	270.0	1.5	155.0	5.83	19.27	+	5.53	6.55	5.53	270.0
162.0	9.88	6.30	21.91	12.60	4.34	4.34	336.0	2.0	162.0	14.69	9.03	31.52	18.03	6.71	6.71	336.0
171.0	3.71	3.59	3.23	2.92	4.14	2.92	270.0	1.5	171.0	4.97	4.72	4.25	3.82	5.23	3.82	270.0
175.5	6.23	4.41	5.70	5.39	5.03	4.41	140.0	1.5	175.5	7.15	5.04	6.38	6.15	5.88	5.04	140.0
187.0	4.89	4.81	4.85	4.85	5.04	4.81	140.0	1.5	187.0	4.90	4.87	4.89	4.90	5.17	4.87	140.0
199.0	5.69	4.40	5.27	9.19	6.43	4.40	140.0	1.5	199.0	5.84	4.50	5.43	9.31	6.62	4.50	140.0
215.0	5.76	9.68	3.85	2.74	4.41	2.74	270.0	1.5	215.0	6.07	10.44	4.30	3.42	4.93	3.42	270.0
224.0	6.03	13.31	7.18	4.38	6.80	4.38	270.0	1.5	224.0	6.57	14.08	7.61	5.01	7.19	5.01	270.0
230.0	4.97	7.33	6.10	6.37	5.75	4.97	74.0	1.5	230.0	5.10	7.58	6.21	6.53	5.79	5.10	74.0
236.0	5.07	5.96	8.89	12.30	5.03	5.03	336.0	1.5	236.0	5.34	6.09	9.00	12.53	5.06	5.06	336.0
240.0	5.74	6.31	4.56	38.27	4.28	4.28	336.0	1.5	240.0	6.07	6.41	4.63	39.07	4.69	4.63	206.0
251.0	4.69	5.36	4.44	8.61	4.54	4.44	206.0	1.5	251.0	6.09	6.69	5.59	9.71	6.00	5.59	206.0
263.0	3.86	4.73	4.44	5.12	5.16	3.86	74.0	1.5	263.0	4.30	4.83	4.50	5.28	5.38	4.30	74.0
280.0	8.88	8.35	24.70	7.28	7.19	7.19	336.0	1.5	280.0	9.78	9.00	25.35	7.90	8.09	7.90	270.0
293.0	5.20	5.81	5.25	2.28	8.27	2.28	270.0	1.5	293.0	5.32	5.85	5.46	3.04	8.74	3.04	270.0
305.0	4.10	3.45	7.29	1.87	7.72	1.87	270.0	1.5	305.0	4.32	3.60	7.51	2.69	8.04	2.69	270.0
312.0	5.18	1.68	4.05	3.93	10.46	1.68	140.0	1.5	312.0	5.88	2.43	4.66	4.87	11.80	2.43	140.0
321.0	6.38	4.73	5.70	7.29	7.71	4.73	140.0	2.0	321.0	6.84	5.07	6.68	8.05	9.17	5.07	140.0
330.0	4.30	2.20	2.83	4.05	5.20	2.20	140.0	1.5	330.0	7.50	4.08	5.13	7.04	9.82	4.08	140.0
347.0	6.23	2.58	3.06	3.09	2.49	2.49	336.0	1.5	347.0	7.20	3.26	3.85	3.60	3.19	3.19	336.0
359.0	4.77	4.03	3.88	3.77	5.15	3.77	270.0	1.5	359.0	5.41	4.41	4.20	4.16	5.72	4.16	270.0
371.0	2.36	2.35	3.15	3.27	3.25	2.35	140.0	1.5	371.0	2.61	2.63	3.29	3.55	3.48	2.61	74.0
383.0	3.57	2.32	2.49	1.90	1.66	1.66	336.0	1.5	383.0	3.93	2.50	2.64	2.41	2.46	2.41	270.0
394.0	3.18	2.30	2.33	3.35	2.41	2.30	140.0	1.5	394.0	3.51	2.82	2.78	3.89	3.11	2.78	206.0

SEGMENT MINIMUM = 1.59 AT THE 152.0 INCH STATION

SEGMENT MINIMUM = 2.41 AT THE 383.0 INCH STATION.

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

Table 16. Forward Segment Non-Star Tip Insulation Performance

RSRM 1-A Forward Segment Non-star Tip

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES — DEGREE LOCATION 74.0	140.0	206.0	270.0	336.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION	STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND — DEGREE LOCATION 74.0	140.0	206.0	270.0	336.0	AVERAGE	EXPOSURE TIME
3.5	0.237<	0.229<	0.268<	0.240<	0.255<	0.268	0.246	0.240	0.016	3.5	6.9	6.7	7.8	7.0	7.5	7.2	34.2
13.0	0.007	0.024	0.067	0.080	0.084	0.084	0.052	0.067	0.035	13.0	0.3	1.1	3.0	3.6	3.8	2.4	22.1
23.0	0	0	0	0	0					23.0	0	0	0	0	0		7.9
27.0	0	0	0	0	0					27.0	0	0	0	0	0		4.8
30.7	0	0	0	0	0					30.7	0	0	0	0	0		4.8
34.2	0	0	0	0	0					34.2	0	0	0	0	0		4.2
37.7	0	0	0	0	0					37.7	0	0	0	0	0		3.6
41.2	0	0	0	0	0					41.2	0	0	0	0	0		3.6
44.0	0	0	0	0	0					44.0	0	0	0	0	0		3.0
94.7	0	0	0	0	0					94.7	0	0	0	0	0		0.8
142.0	0	0	0	0	0					142.0	0	0	0	0	0		1.0
145.7	0	0	0	0	0					145.7	0	0	0	0	0		2.0
148.5	0	0.034	0	0	0	0.034	0.007	0.000	0.015	148.5	0	3.2	0	0	0	0.6	10.7
152.0	0.004	0.005	0.199<	0.010	0.183<	0.199	0.080	0.010	0.101	152.0	0.2	0.2	9.6	0.5	8.8	3.9	20.7
155.0	0.095	0.026	0	0.105	0.082	0.105	0.062	0.082	0.046	155.0	3.4	0.9	0	3.7	2.9	2.2	28.2
162.0	0.051	0.080	0.023	0.040	0.116	0.116	0.062	0.051	0.037	162.0	1.2	1.8	0.5	0.9	2.6	1.4	44.1
171.0	0.147	0.152	0.169	0.187	0.132	0.187	0.157	0.152	0.021	171.0	2.4	2.5	2.8	3.1	2.2	2.6	61.2
175.5	0.097	0.137	0.106	0.112	0.120	0.137	0.114	0.112	0.015	175.5	1.4	2.0	1.6	1.6	1.8	1.7	68.0
187.0	0.131	0.133	0.132	0.132	0.127	0.133	0.131	0.132	0.002	187.0	2.0	2.0	2.0	2.0	1.9	2.0	66.2
199.0	0.113	0.146	0.122	0.070	0.100	0.146	0.110	0.113	0.028	199.0	1.7	2.2	1.8	1.1	1.5	1.7	66.2
215.0	0.111	0.066	0.166	0.233	0.145	0.233	0.144	0.145	0.062	215.0	1.7	1.0	2.5	3.5	2.2	2.2	66.2
224.0	0.106	0.048	0.089	0.146	0.094	0.146	0.097	0.094	0.035	224.0	1.6	0.7	1.3	2.2	1.4	1.5	66.2
230.0	0.118	0.080	0.096	0.092	0.102	0.118	0.098	0.096	0.014	230.0	1.8	1.2	1.5	1.4	1.5	1.5	66.2
236.0	0.114	0.097	0.065	0.047	0.115	0.115	0.088	0.097	0.030	236.0	1.7	1.5	1.0	0.7	1.7	1.3	66.2
240.0	0.100	0.091	0.126	0.015	0.134	0.134	0.093	0.100	0.047	240.0	1.5	1.4	1.9	0.2	2.0	1.4	66.2
251.0	0.121	0.106	0.128	0.066	0.125	0.128	0.109	0.121	0.026	251.0	1.8	1.6	1.9	1.0	1.9	1.6	66.2
263.0	0.147	0.120	0.128	0.111	0.110	0.147	0.123	0.120	0.015	263.0	2.2	1.8	1.9	1.7	1.7	1.9	66.2
280.0	0.064	0.068	0.023	0.078	0.079	0.079	0.062	0.068	0.023	280.0	1.0	1.0	0.3	1.2	1.2	0.9	66.2
293.0	0.105	0.094	0.104	0.240	0.066	0.240	0.122	0.104	0.068	293.0	1.6	1.4	1.6	3.6	1.0	1.8	66.2
305.0	0.128	0.152	0.072	0.280	0.068	0.280	0.140	0.128	0.086	305.0	1.9	2.3	1.1	4.2	1.0	2.1	66.2
312.0	0.101	0.311<	0.129	0.133	0.050	0.311	0.145	0.129	0.099	312.0	1.5	4.7	1.9	2.0	0.8	2.2	66.2
321.0	0.144	0.194	0.161	0.126	0.119	0.194	0.149	0.144	0.030	321.0	2.0	2.6	2.2	1.7	1.6	2.0	73.5
330.0	0.128	0.251	0.195	0.136	0.106	0.251	0.163	0.136	0.059	330.0	1.8	3.5	2.7	1.9	1.5	2.3	72.5
347.0	0.084	0.203	0.171	0.169	0.210	0.210	0.167	0.171	0.050	347.0	1.2	2.8	2.4	2.4	2.9	2.3	71.9
359.0	0.109	0.129	0.134	0.138	0.101	0.138	0.122	0.129	0.016	359.0	1.5	1.8	1.9	1.9	1.4	1.7	71.7
371.0	0.220	0.221	0.165	0.159	0.160	0.221	0.185	0.165	0.032	371.0	3.2	3.2	2.4	2.3	2.3	2.7	69.5
383.0	0.143	0.220	0.205	0.269	0.308<	0.308	0.229	0.220	0.063	383.0	2.0	3.1	2.9	3.8	4.4	3.3	70.3
394.0	0.158	0.219	0.216	0.150	0.209	0.219	0.190	0.209	0.034	394.0	2.2	3.1	3.0	2.1	2.9	2.7	70.9

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

Table 16. RSRM-1A Forward Segment Non-Star Tip Insulation Performance (Cont'd)

RSRM 1-A Forward Segment Non-star Tip
PREFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD	
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	MEDIAN	DEVIATION	MDT
3.5	2.909	2.801	2.780	2.767	2.808	2.767	2.801	0.056	2.120
13.0	0.711	0.758	0.759	0.810	0.805	0.711	0.759	0.041	0.650
23.0	0.645	0.641	0.653	0.693	0.654	0.641	0.653	0.021	0.500
27.0	0.477	0.472	0.605	0.550	0.472	0.472	0.477	0.060	0.450
30.7	0.487	0.469	0.475	0.537	0.675	0.469	0.487	0.086	0.400
34.2	0.579	0.546	0.542	0.601	0.557	0.542	0.557	0.025	0.380
37.7	0.555	0.563	0.535	0.579	0.557	0.535	0.557	0.016	0.330
41.2	0.294	0.283	0.284	0.302	0.297	0.283	0.294	0.008	0.280
44.0	0.299	0.284	0.285	0.292	0.290	0.284	0.290	0.006	0.250
94.7	0.103	0.104	0.110	0.098	0.097	0.097	0.103	0.005	0.090
142.0	0.143	0.150	0.151	0.147	0.154	0.143	0.150	0.004	0.113
145.7	0.253	0.257	0.266	0.255	0.261	0.253	0.257	0.005	0.234
148.5	0.286	0.334	0.336	0.295	0.298	0.286	0.298	0.023	0.276
152.0	0.334	0.351	0.515	0.350	0.547	0.334	0.351	0.103	0.317
155.0	0.554	0.501	0.514	0.581	0.537	0.501	0.537	0.032	0.360
162.0	0.749	0.722	0.725	0.721	0.778	0.721	0.725	0.025	0.504
171.0	0.731	0.718	0.719	0.715	0.691	0.691	0.718	0.015	0.546
175.5	0.694	0.691	0.676	0.689	0.706	0.676	0.691	0.011	0.604
187.0	0.642	0.648	0.646	0.647	0.657	0.642	0.647	0.006	0.640
199.0	0.660	0.657	0.662	0.652	0.662	0.652	0.660	0.004	0.643
215.0	0.674	0.689	0.713	0.796	0.715	0.674	0.713	0.047	0.639
224.0	0.696	0.676	0.677	0.732	0.676	0.676	0.677	0.024	0.639
230.0	0.602	0.606	0.596	0.601	0.591	0.591	0.601	0.006	0.586
236.0	0.609	0.591	0.585	0.589	0.582	0.582	0.589	0.011	0.578
240.0	0.607	0.583	0.583	0.586	0.628	0.583	0.586	0.020	0.574
251.0	0.737	0.709	0.716	0.641	0.750	0.641	0.716	0.042	0.568
263.0	0.632	0.579	0.576	0.586	0.592	0.576	0.586	0.023	0.568
280.0	0.626	0.612	0.583	0.616	0.639	0.583	0.616	0.021	0.568
293.0	0.559	0.550	0.568	0.729	0.577	0.550	0.568	0.075	0.546
305.0	0.553	0.547	0.541	0.753	0.547	0.541	0.547	0.092	0.525
312.0	0.594	0.756	0.601	0.648	0.590	0.590	0.601	0.070	0.523
321.0	0.985	0.983	1.076	1.014	1.091	0.983	1.014	0.051	0.918
330.0	0.960	1.025	1.000	0.958	1.041	0.958	1.000	0.037	0.551
347.0	0.605	0.662	0.658	0.609	0.669	0.605	0.658	0.031	0.523
359.0	0.590	0.569	0.563	0.574	0.578	0.563	0.574	0.010	0.520
371.0	0.574	0.582	0.543	0.564	0.557	0.543	0.564	0.015	0.520
383.0	0.562	0.549	0.542	0.647	0.758	0.542	0.562	0.092	0.511
394.0	0.555	0.617	0.601	0.583	0.650	0.555	0.601	0.036	0.503

Table 16. RSRM-1A Forward Segment Non-Star Tip Insulation Performance (Cont'd)

RSRM 1-A Forward Segment Non-star Tip

POSTFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	MEDIAN	DEVIATION
3.5	2.672	2.572	2.512	2.527	2.553	2.512	2.553	0.063
13.0	0.704	0.734	0.692	0.730	0.721	0.692	0.721	0.018
23.0	L	L	L	L	L	0.641	0.653	0.021
27.0	L	L	L	L	L	0.472	0.477	0.060
30.7	L	L	L	L	L	0.469	0.487	0.086
34.2	L	L	L	L	L	0.542	0.557	0.025
37.7	L	L	L	L	L	0.535	0.557	0.016
41.2	L	L	L	L	L	0.283	0.294	0.008
44.0	L	L	L	L	L	0.284	0.290	0.006
94.7	L	L	L	L	L	0.097	0.103	0.005
142.0	L	L	L	L	L	0.143	0.150	0.004
145.7	L	L	L	L	L	0.253	0.257	0.005
148.5	L	0.300	L	L	L	0.286	0.298	0.019
152.0	0.330	0.346	0.316	0.340	0.364	0.316	0.340	0.018
155.0	0.459	0.475	0.525	0.476	0.455	0.455	0.475	0.028
162.0	0.698	0.642	0.702	0.681	0.662	0.642	0.681	0.025
171.0	0.584	0.566	0.550	0.528	0.559	0.528	0.559	0.021
175.5	0.597	0.554	0.570	0.577	0.586	0.554	0.577	0.016
187.0	0.511	0.515	0.514	0.515	0.530	0.511	0.515	0.007
199.0	0.547	0.511	0.540	0.582	0.562	0.511	0.547	0.026
215.0	0.563	0.623	0.547	0.563	0.570	0.547	0.563	0.029
224.0	0.590	0.628	0.588	0.586	0.582	0.582	0.588	0.019
230.0	0.484	0.526	0.500	0.509	0.489	0.484	0.500	0.017
236.0	0.495	0.494	0.520	0.542	0.467	0.467	0.495	0.029
240.0	0.507	0.492	0.457	0.571	0.494	0.457	0.494	0.042
251.0	0.616	0.603	0.588	0.575	0.625	0.575	0.603	0.020
263.0	0.485	0.459	0.448	0.475	0.482	0.448	0.475	0.016
280.0	0.562	0.544	0.560	0.538	0.560	0.538	0.560	0.011
293.0	0.454	0.456	0.464	0.489	0.511	0.454	0.464	0.025
305.0	0.425	0.395	0.469	0.473	0.479	0.395	0.469	0.037
312.0	0.493	0.445	0.472	0.515	0.540	0.445	0.493	0.037
321.0	0.841	0.789	0.915	0.888	0.972	0.789	0.888	0.070
330.0	0.832	0.774	0.805	0.822	0.935	0.774	0.822	0.061
347.0	0.521	0.459	0.487	0.440	0.459	0.440	0.459	0.032
359.0	0.481	0.440	0.429	0.436	0.477	0.429	0.440	0.024
371.0	0.354	0.361	0.378	0.405	0.397	0.354	0.378	0.022
383.0	0.419	0.329	0.337	0.378	0.450	0.329	0.378	0.052
394.0	0.397	0.398	0.385	0.433	0.441	0.385	0.398	0.025

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUE WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

Table 16. RSRM-1A Forward Segment Non-Star Tip Insulation Performance (Cont'd)

RSRM-1B NOZZLE TO CASE JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
0.0	5.486	4.876	0.610	8.0	9.0
21.6	5.477	4.803	0.674	7.3	8.1
46.8	5.484	4.928	0.556	8.8	9.9
68.4	5.515	4.968	0.547	9.0	10.1
90.0	5.530	4.732	0.798	6.1	6.9
111.6	5.547	4.814	0.733	6.7	7.6
136.8	5.494	4.832	0.662	7.4	8.3
158.4	5.504	4.734	0.770	6.4	7.1
180.0	5.464	4.838	0.626	7.8	8.7
201.6	5.506	4.883	0.623	7.9	8.8
226.8	5.510	4.944	0.566	8.7	9.7
248.4	5.482	4.951	0.531	9.2	10.3
270.0	5.523	4.911	0.612	8.0	9.0
291.6	5.524	5.057	0.467	10.5	11.8
316.8	5.524	4.747	0.777	6.3	7.1
338.4	5.507	4.749	0.758	6.5	7.3
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	5.507	4.857	0.624	6.1	6.9

RSRM-1B Nozzle to Case Joint Performance

Table 17

RSRM-1B AFT FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.734	2.329	0.405	6.4	6.8
10.0	2.730	2.259	0.471	5.5	5.8
20.0	2.754	2.285	0.469	5.5	5.9
30.0	2.765	2.271	0.494	5.3	5.6
40.0	2.746	2.330	0.416	6.2	6.6
50.0	2.780	2.284	0.496	5.2	5.6
60.0	2.788	2.333	0.455	5.7	6.1
70.0	2.772	2.319	0.453	5.7	6.1
80.0	2.748	2.314	0.434	6.0	6.3
90.0	2.755	2.278	0.477	5.4	5.8
100.0	2.753	2.295	0.458	5.7	6.0
110.0	2.754	2.274	0.480	5.4	5.7
120.0	2.750	2.293	0.457	5.7	6.0
130.0	2.751	2.311	0.440	5.9	6.3
140.0	2.751	2.339	0.412	6.3	6.7
150.0	2.757	2.317	0.440	5.9	6.3
160.0	2.755	2.375	0.380	6.8	7.3
170.0	2.747	2.355	0.392	6.6	7.0
180.0	2.735	2.310	0.425	6.1	6.4
190.0	2.753	2.369	0.384	6.8	7.2
200.0	2.748	2.330	0.418	6.2	6.6
210.0	2.747	2.323	0.424	6.1	6.5
220.0	2.753	2.297	0.456	5.7	6.0
230.0	2.749	2.251	0.498	5.2	5.5
242.0	2.748	2.258	0.490	5.3	5.6
250.0	2.735	2.278	0.457	5.7	6.0
260.0	2.728	2.278	0.450	5.8	6.1
270.0	2.722	2.340	0.382	6.8	7.1
280.0	2.718	2.379	0.339	7.7	8.0
290.0	2.710	2.330	0.380	6.8	7.1
300.0	2.702	2.343	0.359	7.2	7.5
310.0	2.715	2.364	0.351	7.4	7.7
320.0	2.725	2.342	0.383	6.8	7.1
330.0	2.723	2.399	0.324	8.0	8.4
340.0	2.710	2.456	0.254	10.2	10.7
350.0	2.712	2.335	0.377	6.9	7.2
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.748	2.321	0.429	5.2	5.5

RSRM-1B Aft Field Joint Performance

Table 18

RSRM-1B CENTER FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.716	2.558	0.158	16.4	17.2
10.0	2.735	2.500	0.235	11.0	11.6
20.0	2.742	2.500	0.242	10.7	11.3
30.0	2.738	2.508	0.230	11.3	11.9
40.0	2.736	2.520	0.216	12.0	12.7
50.0	2.739	2.522	0.217	12.0	12.6
60.0	2.728	2.510	0.218	11.9	12.5
70.0	2.745	2.575	0.170	15.3	16.1
80.0	2.732	2.550	0.182	14.3	15.0
90.0	2.753	2.580	0.173	15.0	15.9
100.0	2.747	2.573	0.174	14.9	15.8
110.0	2.752	2.538	0.214	12.1	12.9
120.0	2.739	2.538	0.201	12.9	13.6
130.0	2.735	2.550	0.185	14.0	14.8
140.0	2.762	2.563	0.199	13.0	13.9
150.0	2.768	2.530	0.238	10.9	11.6
160.0	2.756	2.540	0.216	12.0	12.8
170.0	2.746	2.548	0.198	13.1	13.9
180.0	2.754	2.530	0.224	11.6	12.3
190.0	2.746	2.555	0.191	13.6	14.4
200.0	2.733	2.540	0.193	13.4	14.2
210.0	2.736	2.555	0.181	14.3	15.1
220.0	2.726	2.550	0.176	14.7	15.5
230.0	2.745	2.546	0.199	13.0	13.8
242.0	2.720	2.550	0.170	15.3	16.0
250.0	2.747	2.545	0.202	12.8	13.6
260.0	2.732	2.530	0.202	12.8	13.5
270.0	2.720	2.552	0.168	15.4	16.2
280.0	2.715	2.560	0.155	16.7	17.5
290.0	2.715	2.560	0.155	16.7	17.5
300.0	2.714	2.539	0.175	14.8	15.5
310.0	2.714	2.552	0.162	16.0	16.8
320.0	2.716	2.564	0.152	17.1	17.9
330.0	2.716	2.540	0.176	14.7	15.4
340.0	2.716	2.550	0.166	15.6	16.4
350.0	2.715	2.510	0.205	12.7	13.2
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.735	2.547	0.192	10.7	11.3

RSRM-1B Center Field Joint Performance

Table 19

RSRM-1B FORWARD FIELD JOINT PERFORMANCE

A SAFETY FACTOR OF 2.0 IS REQUIRED

DEGREE LOCATION	PREFIRE (INCHES)	POSTFIRE (INCHES)	MDD	CSF	ASF
2.0	2.712	2.655	0.057	45.5	47.6
10.0	2.713	2.681	0.032	81.1	84.8
20.0	2.737	2.645	0.092	28.2	29.7
30.0	2.757	2.610	0.147	17.7	18.8
40.0	2.711	2.618	0.093	27.9	29.2
50.0	2.740	2.630	0.110	23.6	24.9
60.0	2.738	2.640	0.098	26.5	27.9
70.0	2.734	2.669	0.065	39.9	42.1
80.0	2.721	2.618	0.103	25.2	26.4
90.0	2.732	2.632	0.100	26.0	27.3
100.0	2.727	2.623	0.104	25.0	26.2
110.0	2.747	2.630	0.117	22.2	23.5
120.0	2.730	2.600	0.130	20.0	21.0
130.0	2.719	2.640	0.079	32.8	34.4
140.0	2.740	2.608	0.132	19.7	20.8
150.0	2.718	2.632	0.086	30.2	31.6
160.0	2.739	2.630	0.109	23.8	25.1
170.0	2.710	2.615	0.095	27.3	28.5
180.0	2.738	2.580	0.158	16.4	17.3
190.0	2.724	2.640	0.084	30.9	32.4
200.0	2.724	2.645	0.079	32.8	34.5
210.0	2.738	2.642	0.096	27.0	28.5
220.0	2.736	2.641	0.095	27.3	28.8
230.0	2.727	2.645	0.082	31.6	33.3
242.0	2.729	2.658	0.071	36.5	38.4
250.0	2.728	2.668	0.060	43.3	45.5
260.0	2.724	2.655	0.069	37.6	39.5
270.0	2.724	2.695	0.029	89.5	93.9
280.0	2.737	2.670	0.067	38.7	40.9
290.0	2.728	2.680	0.048	54.1	56.8
300.0	2.718	2.652	0.066	39.3	41.2
310.0	2.726	2.675	0.051	50.9	53.5
320.0	2.722	2.668	0.054	48.1	50.4
330.0	2.704	2.673	0.031	83.7	87.2
340.0	2.688	2.675	0.013	+	+
350.0	2.728	2.680	0.048	54.1	56.8
	MEDIAN	MEDIAN	MEDIAN	MINIMUM	MINIMUM
	2.727	2.644	0.083	16.4	17.3

A " + " INDICATES THAT NEGLIGIBLE MATERIAL DECOMPOSITION HAS OCCURRED.

RSRM-1B Forward Field Joint Performance

Table 20

RSRM 1-B Aft Dome
COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
9.3	3.91	4.18	4.09	3.74	3.48	3.65	3.84	3.75	4.55	4.00	4.12	4.12	4.20	3.78	4.07	3.91	3.48	90.0	1.5
10.7	3.78	3.49	3.68	3.44	3.37	3.66	3.59	4.57	4.48	4.11	4.03	4.04	3.87	4.12	3.81	3.76	3.37	90.0	1.5
12.0	3.48	3.25	3.27	2.86	3.11	3.26	3.16	3.51	4.36	3.75	4.05	3.70	3.58	3.49	3.65	3.43	2.86	68.4	1.5
13.1	3.31	3.11	2.92	2.59	2.82	2.84	2.82	3.33	3.69	3.62	3.36	3.35	3.29	3.20	3.10	3.43	2.59	68.4	1.5
14.4	3.18	3.10	2.99	2.50	2.81	2.75	2.86	3.31	3.47	3.19	3.35	3.39	3.39	3.09	2.99	3.53	2.50	68.4	1.5
16.0	2.98	3.03	2.85	2.44	2.73	2.72	2.74	3.28	3.47	3.06	3.08	4.18	3.09	3.11	2.81	3.40	2.44	68.4	1.5
17.3	2.96	2.90	3.16	2.41	2.77	2.88	2.71	3.14	3.35	3.19	2.96	3.14	3.04	3.09	2.51	3.30	2.41	68.4	1.5
18.5	3.24	3.43	3.99	2.58	3.20	3.52	2.67	3.27	3.55	3.20	2.73	3.29	3.07	3.23	2.93	3.19	2.58	68.4	1.5
19.5	3.79	4.00	3.57	2.94	3.41	4.17	3.10	3.47	3.92	3.71	2.30	3.58	3.60	3.71	3.63	3.35	2.30	226.8	1.5
21.3	4.22	3.86	3.16	3.34	3.63	3.76	3.57	3.75	3.99	3.70	3.21	3.66	4.21	3.57	4.01	3.38	3.16	46.8	1.5
24.3	3.51	3.52	2.89	3.11	3.11	3.65	3.14	3.47	3.41	3.33	4.05	3.43	3.56	2.85	3.21	2.99	2.85	291.6	1.5
33.0	2.61	2.55	3.00	2.51	2.34	2.29	2.74	2.83	2.57	2.31	2.33	2.46	2.26	2.97	2.41	3.07	2.26	270.0	1.5
37.0	4.54	4.04	3.05	3.31	3.82	3.38	4.45	3.46	3.54	3.38	3.18	3.10	3.89	4.51	3.23	3.72	3.05	46.8	1.5
40.0	2.67	2.64	2.42	2.51	2.46	2.43	2.92	3.01	2.99	2.64	3.23	2.49	2.59	2.93	2.39	2.59	2.39	316.8	1.5
42.0	2.52	2.45	2.16	2.41	2.30	2.21	2.45	2.61	2.18	2.61	2.38	2.49	2.05	2.41	2.21	2.64	2.05	270.0	1.5
45.0	2.56	2.51	2.19	2.24	2.26	2.13	2.46	2.67	2.38	2.68	2.20	2.44	2.21	2.49	2.41	2.64	2.13	111.6	1.5
48.0	3.43	3.31	2.86	3.16	3.29	2.75	3.39	3.91	2.76	3.34	2.92	4.08	2.88	3.78	2.57	3.31	2.57	316.8	1.5
53.0	4.24	3.90	3.29	4.55	2.88	3.80	3.18	3.69	3.10	3.22	3.69	5.19	3.80	3.71	3.80	4.17	2.88	90.0	1.5

SEGMENT MINIMUM = 2.05 AT THE 42.0 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE
9.3	4.29	4.47	4.41	4.11	3.80	3.94	4.15	4.05	4.89	4.38	4.48	4.45	4.57	4.13	4.41	4.27	3.80	90.0
10.7	4.14	3.75	3.96	3.74	3.66	3.94	3.86	4.92	4.79	4.45	4.34	4.36	4.18	4.48	4.13	4.10	3.66	90.0
12.0	3.83	3.53	3.55	3.13	3.40	3.54	3.44	3.81	4.71	4.07	4.37	4.01	3.89	3.80	3.97	3.76	3.13	68.4
13.1	3.64	3.39	3.19	2.84	3.10	3.10	3.09	3.63	4.02	3.95	3.64	3.64	3.57	3.50	3.41	3.76	2.84	68.4
14.4	3.44	3.32	3.20	2.68	3.03	2.95	3.06	3.55	3.73	3.42	3.54	3.62	3.60	3.33	3.22	3.81	2.68	68.4
16.0	3.30	3.30	3.10	2.66	2.99	2.96	2.99	3.58	3.81	3.36	3.33	4.56	3.36	3.43	3.09	3.72	2.66	68.4
17.3	3.34	3.28	3.53	2.71	3.13	3.20	3.05	3.53	3.78	3.59	3.29	3.53	3.39	3.49	2.93	3.73	2.71	68.4
18.5	3.72	3.93	4.52	2.94	3.69	3.99	3.08	3.73	4.07	3.65	3.08	3.78	3.50	3.72	3.35	3.69	2.94	68.4
19.5	4.43	4.66	4.10	3.38	3.99	4.83	3.62	4.03	4.58	4.31	2.65	4.18	4.17	4.38	4.19	3.94	2.65	226.8
21.3	4.98	4.52	3.67	3.87	4.28	4.38	4.15	4.39	4.70	4.37	3.72	4.31	4.90	4.29	4.68	4.01	3.67	46.8
24.3	4.05	4.05	3.24	3.53	3.52	4.15	3.58	3.95	3.89	3.81	4.57	3.94	4.04	3.31	3.62	3.48	3.24	46.8
33.0	2.96	2.90	3.40	2.85	2.67	2.61	3.07	3.11	2.91	2.63	2.67	2.80	2.61	3.34	2.79	3.54	2.61	270.0
37.0	5.59	4.81	3.63	3.99	4.54	4.09	5.31	4.22	4.33	3.99	3.88	3.62	4.57	5.21	3.94	4.51	3.62	248.4
40.0	3.14	3.04	2.79	2.90	2.83	2.78	3.20	3.31	3.35	3.09	3.57	2.83	3.00	3.37	2.77	2.98	2.77	316.8
42.0	2.98	2.81	2.54	2.75	2.62	2.51	2.69	2.85	2.52	2.90	2.64	2.73	2.39	2.79	2.58	3.04	2.39	270.0
45.0	3.03	2.89	2.61	2.61	2.58	2.46	2.69	2.90	2.66	3.02	2.59	2.77	2.58	2.92	2.83	3.05	2.46	111.6
48.0	4.22	3.93	3.59	3.89	3.92	3.35	4.13	4.54	3.36	4.01	3.51	4.90	3.75	4.49	3.32	4.12	3.32	316.8
53.0	4.74	4.47	3.75	4.98	3.31	4.27	3.76	4.20	3.51	3.72	4.20	5.75	4.28	4.19	4.34	4.69	3.31	90.0

SEGMENT MINIMUM = 2.39 AT THE 42.0 INCH STATION.

RSRM-1B Aft Dome Insulation Performance

Table 21

RSRM 1-B Aft Dome
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MAX.	AVE.	MEDIAN	STANDARD DEVIATION
9.3	1.253	1.173	1.197	1.311	1.408	1.343	1.277	1.308	1.076	1.226	1.189	1.188	1.166	1.295	1.203	1.252	1.408	1.242	1.239	0.081
10.7	1.243	1.348	1.276	1.367	1.394	1.284	1.310	1.029	1.048	1.144	1.167	1.164	1.216	1.140	1.232	1.251	1.394	1.226	1.238	0.106
12.0	1.294	1.385	1.376	1.572	1.445	1.382	1.422	1.283	1.033	1.200	1.112	1.215	1.256	1.291	1.232	1.311	1.572	1.301	1.293	0.132
13.1	1.301	1.383	1.473	1.661	1.525	1.516	1.524	1.291	1.164	1.187	1.279	1.283	1.308	1.344	1.386	1.255	1.661	1.368	1.326	0.138
14.4	1.289	1.321	1.372	1.637	1.460	1.489	1.436	1.240	1.180	1.287	1.223	1.208	1.209	1.327	1.370	1.160	1.637	1.326	1.305	0.130
16.0	1.268	1.249	1.324	1.547	1.387	1.389	1.382	1.154	1.089	1.235	1.229	0.905	1.222	1.217	1.343	1.113	1.547	1.253	1.242	0.149
17.3	1.202	1.226	1.127	1.475	1.285	1.238	1.316	1.134	1.064	1.117	1.202	1.133	1.172	1.152	1.418	1.080	1.475	1.209	1.187	0.116
18.5	1.038	0.981	0.842	1.303	1.050	0.954	1.258	1.027	0.946	1.051	1.233	1.022	1.093	1.039	1.146	1.052	1.303	1.065	1.044	0.121
19.5	0.831	0.787	0.882	1.073	0.924	0.756	1.016	0.908	0.803	0.850	1.368	0.880	0.875	0.850	0.867	0.941	1.368	0.913	0.877	0.145
21.3	0.697	0.762	0.930	0.879	0.809	0.782	0.823	0.785	0.736	0.794	0.917	0.803	0.699	0.824	0.733	0.870	0.930	0.803	0.799	0.070
24.3	0.838	0.835	1.016	0.945	0.946	0.805	0.935	0.848	0.863	0.883	0.726	0.857	0.825	1.030	0.917	0.982	1.030	0.891	0.873	0.082
33.0	1.226	1.253	1.065	1.274	1.367	1.398	1.170	1.129	1.245	1.387	1.376	1.303	1.414	<1.078	1.328	1.041	1.414	1.253	1.264	0.125
37.0	0.573	0.644	0.853	0.786	0.681	0.769	0.584	0.752	0.734	0.770	0.818	0.838	0.669	0.576	0.805	0.699	0.853	0.722	0.743	0.093
40.0	0.974	0.983	1.075	1.037	1.055	1.072	0.891	0.864	0.870	0.986	0.804	1.046	1.002	0.888	1.086	1.002	1.086	0.977	0.994	0.088
42.0	1.030	1.061	1.201	1.080	1.132	1.178	1.060	0.998	1.193	0.998	1.093	1.044	1.266	1.081	1.179	0.984	1.266	1.099	1.081	0.084
45.0	1.017	1.037	1.189	1.163	1.148	1.221	1.059	0.974	1.091	0.970	1.180	1.067	1.178	1.044	1.077	0.984	1.221	1.087	1.072	0.083
48.0	0.757	0.785	0.909	0.824	0.791	0.945	0.766	0.665	0.943	0.779	0.890	0.637	0.903	0.687	1.013	0.785	1.013	0.817	0.788	0.108
53.0	0.794	0.863	1.024	0.740	1.171	0.888	1.059	0.914	1.086	1.046	0.913	0.649	0.887	0.908	0.888	0.809	1.171	0.915	0.898	0.136

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	AVERAGE	EXPOSURE TIME
9.3	10.2	9.6	9.8	10.7	11.5	11.0	10.4	10.7	8.8	10.0	9.7	9.7	9.5	10.6	9.8	10.2	10.1	122.4
10.7	10.3	11.2	10.6	11.4	11.6	10.7	10.9	8.6	8.7	9.5	9.7	9.7	10.1	9.5	10.2	10.4	10.2	120.2
12.0	11.0	11.8	11.7	13.4	12.3	11.8	12.1	10.9	8.8	10.2	9.5	10.4	10.7	11.0	10.5	11.2	11.1	117.2
13.1	11.4	12.1	12.9	14.5	13.3	13.3	13.3	11.3	10.2	10.4	11.2	11.2	11.4	11.7	12.1	11.0	12.0	114.4
14.4	11.4	11.7	12.2	14.5	13.0	13.2	12.8	11.0	10.5	11.4	10.9	10.7	10.7	11.8	12.2	10.3	11.8	112.6
16.0	11.7	11.5	12.2	14.3	12.8	12.8	12.7	10.6	10.0	11.4	11.3	8.3	11.3	11.2	12.4	10.3	11.6	108.4
17.3	11.4	11.6	10.7	14.0	12.2	11.7	12.5	10.7	10.1	10.6	11.4	10.7	11.1	10.9	13.4	10.2	11.4	105.6
18.5	10.0	9.5	8.1	12.6	10.2	9.2	12.2	9.9	9.1	10.2	11.9	9.9	10.6	10.0	11.1	10.2	10.3	103.4
19.5	8.2	7.8	8.7	10.6	9.1	7.5	10.0	9.0	7.9	8.4	13.5	8.7	8.6	8.4	8.6	9.3	9.0	101.4
21.3	7.1	7.8	9.5	9.0	8.3	8.0	8.4	8.0	7.5	8.1	9.4	8.2	7.1	8.4	7.5	8.9	8.2	98.0
24.3	13.1	13.0	15.9	14.8	14.8	12.6	14.6	13.3	13.5	13.8	11.3	13.4	12.9	16.1	14.3	15.3	13.9	64.0
33.0	14.6	15.0	12.7	15.2	16.3	16.7	14.0	13.5	14.9	16.6	16.4	15.5	16.9	12.9	15.8	12.4	15.0	83.8
37.0	7.2	8.1	10.7	9.9	8.6	9.7	7.4	9.5	9.2	9.7	10.3	10.6	8.4	7.3	10.1	8.8	9.1	79.4
40.0	12.6	12.7	13.9	13.4	13.6	13.8	11.5	11.1	11.2	12.7	10.4	13.5	12.9	11.4	14.0	12.9	12.6	77.6
42.0	13.4	13.9	15.7	14.1	14.8	15.4	13.8	13.0	15.6	13.0	14.3	13.6	16.5	14.1	15.4	12.8	14.3	76.6
45.0	13.5	13.8	15.8	15.5	15.3	16.2	14.1	13.0	14.5	12.9	15.7	14.2	15.7	13.9	14.3	13.1	14.5	75.2
48.0	10.6	11.0	12.7	11.5	11.1	13.2	10.7	9.3	13.2	10.9	12.5	8.9	12.6	9.6	14.2	11.0	11.4	71.4
53.0	10.6	11.5	13.7	9.9	15.6	11.8	14.1	12.2	14.5	13.9	12.2	8.7	11.8	12.1	11.8	10.8	12.2	75.0

RSRM-1B Aft Dome Insulation Performance (Cont'd)

Table 21 (Cont'd)

RSRM 1-B Aft Dome
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MIN.	MEDIAN	STANDARD DEVIATION	MDT
9.3	5.370	5.242	5.278	5.390	5.347	5.297	5.305	5.292	5.257	5.370	5.321	5.288	5.323	5.348	5.311	5.352	5.242	5.316	0.042	4.900
10.7	5.142	5.059	5.057	5.118	5.101	5.056	5.061	5.058	5.017	5.090	5.070	5.076	5.080	5.105	5.091	5.127	5.017	5.078	0.032	4.700
12.0	4.953	4.887	4.882	4.927	4.919	4.895	4.889	4.885	4.863	4.881	4.862	4.873	4.882	4.909	4.897	4.927	4.862	4.888	0.025	4.500
13.1	4.739	4.692	4.692	4.722	4.730	4.705	4.710	4.689	4.675	4.693	4.651	4.669	4.668	4.708	4.720	4.724	4.651	4.699	0.025	4.300
14.4	4.437	4.390	4.385	4.392	4.417	4.395	4.396	4.400	4.396	4.399	4.333	4.374	4.348	4.416	4.415	4.419	4.333	4.396	0.026	4.100
16.0	4.181	4.127	4.102	4.109	4.147	4.107	4.127	4.128	4.151	4.155	4.089	4.129	4.102	4.170	4.144	4.139	4.089	4.128	0.026	3.780
17.3	4.015	4.022	3.977	3.992	4.026	3.964	4.012	4.001	4.022	4.011	3.958	3.996	3.976	4.026	4.150	4.031	3.958	4.012	0.044	3.560
18.5	3.863	3.858	3.806	3.830	3.877	3.805	3.871	3.830	3.848	3.836	3.801	3.861	3.825	3.868	3.836	3.878	3.801	3.842	0.026	3.360
19.5	3.681	3.668	3.617	3.626	3.687	3.649	3.676	3.661	3.679	3.667	3.624	3.681	3.645	3.721	3.633	3.703	3.617	3.668	0.030	3.150
21.3	3.468	3.448	3.412	3.406	3.461	3.426	3.413	3.450	3.460	3.471	3.413	3.462	3.424	3.537	3.428	3.488	3.406	3.449	0.035	2.940
24.3	3.394	3.383	3.294	3.337	3.332	3.344	3.347	3.348	3.353	3.368	3.315	3.374	3.337	3.406	3.321	3.417	3.294	3.348	0.034	2.940
33.0	3.624	3.636	3.617	3.626	3.650	3.645	3.595	3.514	3.622	3.647	3.674	3.653	3.686	3.596	3.706	3.690	3.514	3.641	0.046	3.200
37.0	3.204	3.100	3.097	3.140	3.093	3.143	3.103	3.170	3.179	3.071	3.174	3.032	3.055	3.003	3.172	3.152	3.003	3.122	0.058	2.600
40.0	3.055	2.987	3.002	3.004	2.985	2.981	2.850	2.864	2.918	3.050	2.870	2.957	3.010	2.993	3.011	2.986	2.850	2.987	0.063	2.600
42.0	3.066	2.983	3.048	2.970	2.970	2.960	2.855	2.845	3.011	2.890	2.890	2.846	3.028	3.012	3.039	2.989	2.845	2.977	0.075	2.600
45.0	3.077	2.997	3.102	3.031	2.967	3.006	2.854	2.825	2.900	2.934	3.060	2.960	3.042	3.051	3.052	3.006	2.825	3.006	0.080	2.600
48.0	3.197	3.087	3.260	3.205	3.098	3.164	3.165	3.020	3.170	3.125	3.120	3.124	3.384	3.084	3.364	3.234	3.020	3.164	0.099	2.600
53.0	3.764	3.857	3.845	3.686	3.877	3.794	3.985	3.835	3.810	3.890	3.839	3.732	3.800	3.802	3.855	3.792	3.686	3.822	0.068	3.370

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	MEDIAN	STANDARD DEVIATION
9.3	4.117	4.069	4.081	4.079	3.939	3.954	4.028	3.984	4.181	4.144	4.132	4.100	4.157	4.053	4.108	4.100	3.939	4.090	0.070
10.7	3.899	3.711	3.781	3.751	3.707	3.772	3.751	4.029	3.969	3.946	3.903	3.912	3.864	3.965	3.859	3.876	3.707	3.870	0.099
12.0	3.659	3.502	3.506	3.355	3.474	3.513	3.467	3.602	3.830	3.681	3.750	3.658	3.626	3.618	3.665	3.616	3.355	3.617	0.119
13.1	3.438	3.309	3.219	3.061	3.205	3.189	3.186	3.398	3.511	3.506	3.372	3.386	3.360	3.364	3.334	3.469	3.061	3.362	0.128
14.4	3.148	3.069	3.013	2.755	2.957	2.906	2.960	3.160	3.216	3.112	3.110	3.166	3.139	3.089	3.045	3.259	2.755	3.099	0.127
16.0	2.913	2.878	2.778	2.562	2.760	2.718	2.745	2.974	3.062	2.920	2.860	3.224	2.880	2.953	2.801	3.026	2.562	2.879	0.156
17.3	2.813	2.796	2.850	2.517	2.741	2.726	2.696	2.867	2.958	2.894	2.756	2.863	2.804	2.874	2.732	2.951	2.517	2.809	0.109
18.5	2.825	2.877	2.964	2.527	2.827	2.851	2.613	2.803	2.902	2.785	2.568	2.839	2.732	2.829	2.690	2.826	2.527	2.826	0.122
19.5	2.850	2.881	2.735	2.553	2.763	2.893	2.660	2.753	2.876	2.817	2.256	2.801	2.770	2.871	2.766	2.762	2.256	2.768	0.159
21.3	2.771	2.686	2.482	2.527	2.652	2.644	2.590	2.665	2.724	2.677	2.496	2.659	2.725	2.713	2.695	2.618	2.482	2.662	0.084
24.3	2.556	2.548	2.278	2.392	2.386	2.539	2.412	2.500	2.490	2.485	2.589	2.517	2.512	2.376	2.404	2.435	2.278	2.487	0.084
33.0	2.398	2.383	2.552	2.352	2.283	2.247	2.425	2.385	2.377	2.260	2.298	2.350	2.272	2.518	2.378	2.649	2.247	2.378	0.111
37.0	2.631	2.456	2.244	2.354	2.412	2.374	2.519	2.418	2.445	2.301	2.356	2.194	2.386	2.427	2.367	2.453	2.194	2.399	0.103
40.0	2.081	2.004	1.927	1.967	1.930	1.909	1.959	2.000	2.048	2.064	2.066	1.911	2.008	2.105	1.925	1.984	1.909	1.992	0.065
42.0	2.036	1.922	1.847	1.890	1.838	1.782	1.795	1.847	1.818	1.892	1.797	1.802	1.762	1.931	1.860	2.005	1.762	1.847	0.078
45.0	2.060	1.960	1.913	1.868	1.819	1.785	1.795	1.851	1.809	1.964	1.880	1.893	1.864	2.007	1.975	2.022	1.785	1.887	0.085
48.0	2.440	2.302	2.351	2.381	2.307	2.219	2.399	2.355	2.227	2.346	2.230	2.487	2.481	2.397	2.351	2.449	2.219	2.353	0.085
53.0	2.970	2.994	2.821	2.946	2.706	2.906	2.926	2.921	2.724	2.844	2.926	3.083	2.913	2.894	2.967	2.983	2.706	2.924	0.097

RSRM-1B Aft Dome Insulation Performance (Cont'd)

Table 21 (Cont'd)

RSRM 1-B Aft Cylinder
COMPLIANCE SAFETY FACTOR (CSF)

STATION	DEGREE LOCATION																		REQUIRED
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE	SAFETY FACTOR
56.0	3.42	4.13	3.11	4.35	2.80	3.34	3.49	3.44	3.16	3.13	3.92	4.23	3.52	3.29	3.49	3.35	2.80	90.0	2.0
68.0	3.77	1.73	2.89	3.96	3.32	2.70	2.86	2.97	4.17	2.84	3.12	5.18	3.34	3.41	3.42	3.23	1.73	21.6	1.5
72.0	4.17	1.76	3.40	5.71	4.54	4.02	3.00	4.07	4.11	4.16	8.97	5.97	3.37	4.90	3.30	3.65	1.76	21.6	1.5
75.0	4.14	4.01	3.89	4.84	3.29	4.17	3.70	3.67	4.25	3.77	12.00	3.56	8.37	5.49	4.28	3.89	3.29	90.0	1.5
78.0	4.02	3.90	3.64	4.75	4.18	4.17	3.88	3.50	3.90	3.46	17.02	3.17	8.47	6.08	4.28	3.29	3.17	248.4	1.5
81.0	4.47	3.99	3.81	5.15	4.06	3.98	3.50	3.20	3.71	3.29	19.18	5.00	6.86	5.28	3.89	3.39	3.20	158.4	1.5
85.0	3.96	3.38	3.69	3.32	3.39	3.44	3.27	2.91	3.00	3.00	7.39	3.42	6.05	4.06	3.50	3.19	2.91	158.4	1.5
90.0	3.55	3.07	3.33	3.09	3.32	3.38	3.12	2.59	3.40	2.81	4.63	3.21	2.93	3.48	3.27	3.09	2.59	158.4	1.5
98.0	3.03	2.82	2.15	2.93	3.60	2.82	2.57	2.53	2.40	2.54	4.01	2.65	2.62	2.97	2.83	3.06	2.15	46.8	1.5
105.8	2.67		1.93		2.76		2.42		3.14		2.69		2.89		2.99		1.93	46.8	1.5
116.0	3.00		3.03		2.90		2.83		3.00		3.05		3.41		3.19		2.83	136.8	1.5
124.5	2.76		2.87		2.63		2.65		2.89		2.97		3.89		2.85		2.63	90.0	1.5
133.0	2.71		2.71		2.38		2.30		2.37		2.61		2.85		2.49		2.30	136.8	1.5
145.5	2.96		2.45		2.74		2.18		2.35		2.40		2.69		2.73		2.18	136.8	1.5
158.5	2.76		2.47		2.69		2.61		2.41		2.89		3.21		2.87		2.41	180.0	1.5
168.3	4.55		2.77		3.27		2.70		3.11		3.13		4.27		2.95		2.70	136.8	1.5
177.7	2.70		2.60		2.73		2.82		2.49		2.79		3.08		2.67		2.49	180.0	2.0
192.5	2.68		2.39		2.64		2.56		2.71		2.59		3.32		2.83		2.39	46.8	1.5
202.5	2.66		2.64		2.58		2.50		2.64		2.67		3.16		3.35		2.50	136.8	1.5
214.0	2.72		3.10		2.73		2.51		2.70		2.49		3.30		4.09		2.49	226.8	1.5
227.3	2.45		2.75		2.66		2.15		2.30		2.03		3.51		3.33		2.03	226.8	1.5
238.3	2.41		2.62		2.35		2.44		2.17		2.42		2.65		2.37		2.17	180.0	1.5
250.0	2.72		3.04		2.93		2.71		2.70		2.57		2.97		3.11		2.57	226.8	1.5
267.0	3.23		3.31		2.81		2.92		2.91		2.63		3.31		2.72		2.63	226.8	1.5
283.9	2.76		4.13		3.69		2.43		2.80		3.54		2.87		1.75		1.75	316.8	1.5
299.1	3.76		4.27		3.92		3.58		4.86		3.66		6.15		2.40		2.40	316.8	2.0
322.0	5.67		4.58		5.35		3.58		4.87		4.27		7.45		4.75		3.58	136.8	1.5
339.0	5.00		7.76		7.76		5.28		4.75		5.14		5.85		4.81		4.75	180.0	1.5
344.0	2.81		3.25		2.15		1.78		3.45		5.07		2.45		4.47		1.78	136.8	1.5
358.0	7.45		+		+		+		+		+		+		9.05		7.45	0.0	1.5
363.0	5.51		9.74		5.94		9.50		1.96		+		4.63		4.69		1.96	180.0	1.5
367.0	4.69		4.87		13.57		+		3.69		+		25.33		7.17		3.69	180.0	1.5
372.0	4.00		3.23		18.18		7.69		7.14		8.70		12.50		7.84		3.23	46.8	1.5
375.0	5.05		11.43		10.21		5.16		7.87		7.16		6.86		7.62		5.05	0.0	1.5
377.5	3.93		3.40		6.09		6.63		3.79		6.39		8.83		+		3.40	46.8	1.5

SEGMENT MINIMUM = 1.73 AT THE 68.0 INCH STATION.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1B Aft Cylinder Insulation Performance

Table 22

RSRM 1-B Aft Cylinder
ACTUAL SAFETY FACTOR (ASF)

STATION	DEGREE LOCATION																	
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	PLANE
56.0	4.34	5.11	3.87	5.15	3.51	4.17	4.38	4.22	3.96	3.98	4.82	5.20	4.38	4.05	4.33	4.11	3.51	90.0
68.0	4.79	2.72	3.79	4.96	4.17	3.58	3.67	3.75	5.21	3.73	4.01	6.09	4.35	4.15	4.27	3.88	2.72	21.6
72.0	4.46	2.52	3.66	6.30	4.86	4.32	3.40	4.31	4.40	4.51	9.48	6.39	4.04	5.15	3.71	3.92	2.52	21.6
75.0	4.57	4.29	4.21	5.50	3.88	4.58	4.06	4.04	4.75	4.16	12.99	4.20	8.87	5.76	4.63	4.36	3.88	90.0
78.0	4.38	4.16	3.96	5.16	4.57	4.48	4.17	3.83	4.28	3.82	18.35	3.70	9.29	6.38	4.55	3.64	3.64	338.4
81.0	5.02	4.28	4.23	5.58	4.73	4.24	3.85	3.49	4.12	3.73	20.90	5.45	7.87	5.65	4.22	3.82	3.49	158.4
85.0	4.68	4.00	4.40	4.00	4.16	4.07	3.91	3.57	3.70	3.65	8.76	4.14	7.27	4.76	4.16	3.79	3.57	158.4
90.0	4.22	3.60	3.82	3.59	4.07	3.82	3.56	3.07	4.03	3.31	5.48	3.75	3.84	4.02	3.81	3.54	3.07	158.4
98.0	4.08	3.89	3.17	3.95	4.85	3.80	3.63	3.56	3.49	3.59	5.66	3.74	3.71	4.16	3.97	4.05	3.17	46.8
105.8	2.83		2.31		2.85		2.51		3.24		2.75		3.01		3.04		2.31	46.8
116.0	3.16		3.08		3.01		2.94		3.10		3.10		3.48		3.27		2.94	136.8
124.5	2.89		2.95		2.87		2.75		3.01		3.04		4.01		2.94		2.75	136.8
133.0	3.23		3.46		3.01		2.78		2.74		2.95		3.25		3.03		2.74	180.0
145.5	3.01		2.48		2.80		2.20		2.44		2.43		2.69		2.74		2.20	136.8
158.5	2.78		2.53		2.72		2.69		2.52		3.03		3.24		2.94		2.52	180.0
168.3	5.94		3.74		3.96		3.29		3.86		4.08		5.48		3.86		3.29	136.8
177.7	4.10		3.95		4.14		4.31		3.76		4.15		4.63		4.06		3.76	180.0
192.5	3.16		2.84		3.07		3.01		3.15		2.96		3.81		3.32		2.84	46.8
202.5	2.68		2.65		2.64		2.51		2.67		2.68		3.16		3.37		2.51	136.8
214.0	2.74		3.12		2.74		2.54		2.75		2.51		3.31		4.13		2.51	226.8
227.3	3.04		3.16		3.14		2.69		2.79		2.42		4.04		4.24		2.42	226.8
238.3	2.95		3.19		2.95		2.92		2.72		2.92		3.26		2.87		2.72	180.0
250.0	2.79		3.05		2.93		2.71		2.82		2.61		3.10		3.14		2.61	226.8
267.0	3.33		3.46		3.01		2.99		3.06		2.82		3.50		2.82		2.82	316.8
283.9	3.36		4.39		3.95		2.74		3.04		3.64		3.31		2.57		2.57	316.8
299.1	5.97		6.82		6.28		5.62		7.54		5.85		9.89		4.18		4.18	316.8
322.0	6.04		4.89		5.48		3.67		5.04		4.40		7.75		4.89		3.67	136.8
339.0	5.32		8.20		7.94		5.38		4.89		5.28		6.03		4.99		4.89	180.0
344.0	3.91		4.29		3.05		2.60		3.75		5.61		3.34		5.47		2.60	136.8
358.0	7.96		+		+		+		+		+		+		9.55		7.96	0.0
363.0	7.57		13.00		8.11		14.00		3.33		+		6.83		6.17		3.33	180.0
367.0	5.68		5.95		14.89		+		4.88		+		28.20		8.11		4.88	180.0
372.0	4.69		4.08		18.59		9.00		7.45		9.22		13.03		8.29		4.08	46.8
375.0	5.94		12.17		10.60		5.49		8.38		7.91		7.83		8.19		5.49	136.8
377.5	5.54		4.72		7.41		9.32		4.87		7.71		11.00		+		4.72	46.8

SEGMENT MINIMUM = 2.20 AT THE 145.5 INCH STATION.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1B Aft Cylinder Insulation Performance (Cont'd)

Table 22 (Cont'd)

RSRM 1-B Aft Cylinder
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MAX.	AVE.	MEDIAN	STANDARD DEVIATION
56.0	0.816	0.675	0.896	0.641	0.998	0.836	0.799	0.810	0.883	0.892	0.712	0.660	0.792	0.849	0.799	0.832	0.998	0.806	0.813	0.095
68.0	0.584	1.273<	0.762	0.555	0.663	0.814	0.768	0.740	0.527	0.774	0.705	0.425	0.658	0.645	0.644	0.681	1.273	0.701	0.672	0.184
72.0	0.480	1.137<	0.589	0.350	0.441	0.497	0.667	0.492	0.487	0.481	0.223	0.335	0.594	0.408	0.606	0.548	1.137	0.521	0.490	0.199
75.0	0.435	0.449	0.463	0.372	0.547	0.432	0.487	0.490	0.424	0.477	0.150	0.505	0.215	0.328	0.421	0.463	0.547	0.416	0.442	0.105
78.0	0.398	0.410	0.439	0.337	0.383	0.384	0.412	0.457	0.410	0.462	0.094	0.505	0.189	0.263	0.374	0.487	0.505	0.375	0.404	0.110
81.0	0.313	0.351	0.367	0.272	0.345	0.352	0.400	0.438	0.377	0.426	0.073	0.280	0.204	0.265	0.360	0.413	0.438	0.327	0.352	0.093
85.0	0.328	0.385	0.352	0.392	0.384	0.378	0.397	0.447	0.433	0.434	0.176	0.380	0.215	0.320	0.371	0.407	0.447	0.362	0.382	0.074
90.0	0.356	0.412	0.380	0.409	0.381	0.374	0.405	0.488	0.372	0.450	0.273	0.394	0.432	0.363	0.387	0.410	0.488	0.393	0.391	0.047
98.0	0.374	0.402	0.527	0.387	0.315	0.402	0.442	0.449	0.473	0.446	0.283	0.428	0.434	0.382	0.401	0.371	0.527	0.407	0.402	0.059
105.8	0.405		0.559		0.392		0.447		0.344		0.402		0.374		0.361		0.559	0.411	0.397	0.068
116.0	0.350		0.347		0.362		0.371		0.350		0.344		0.308		0.329		0.371	0.345	0.349	0.019
124.5	0.373		0.359		0.391		0.389		0.356		0.347		0.265		0.362		0.391	0.355	0.361	0.040
133.0	0.362		0.362		0.411		0.427		0.414		0.375		0.344		0.394		0.427	0.386	0.384	0.030
145.5	0.314		0.380		0.339		0.427		0.395		0.387		0.346		0.341		0.427	0.366	0.363	0.037
158.5	0.319		0.356		0.327		0.337		0.365		0.305		0.274		0.307		0.365	0.324	0.323	0.029
168.3	0.187		0.307		0.260		0.315		0.273		0.272		0.199		0.288		0.315	0.263	0.273	0.047
177.7	0.371		0.385		0.366		0.355		0.402		0.358		0.325		0.374		0.402	0.367	0.368	0.023
192.5	0.291		0.327		0.295		0.305		0.288		0.301		0.235		0.276		0.327	0.290	0.293	0.027
202.5	0.274		0.276		0.283		0.292		0.276		0.273		0.231		0.218		0.292	0.265	0.275	0.026
214.0	0.257		0.226		0.256		0.279		0.259		0.281		0.212		0.171		0.281	0.243	0.257	0.037
227.3	0.265		0.236		0.244		0.302		0.282		0.320<		0.185		0.195		0.320	0.254	0.255	0.048
238.3	0.220		0.202		0.226		0.217		0.244		0.219		0.200		0.224		0.244	0.219	0.220	0.014
250.0	0.202		0.181		0.188		0.203		0.204		0.214		0.185		0.177		0.214	0.194	0.195	0.013
267.0	0.155		0.151		0.178		0.171		0.172		0.190		0.151		0.184		0.190	0.169	0.172	0.015
283.9	0.163		0.109		0.122		0.185		0.161		0.127		0.157		0.257<		0.257	0.160	0.159	0.047
299.1	0.178		0.157		0.171		0.187		0.138		0.183		0.109		0.279<		0.279	0.175	0.175	0.049
322.0	0.067		0.083		0.071		0.106		0.078		0.089		0.051		0.080		0.106	0.078	0.079	0.016
339.0	0.076		0.049		0.049		0.072		0.080		0.074		0.065		0.079		0.080	0.068	0.073	0.013
344.0	0.135		0.117		0.177		0.214<		0.110		0.075		0.155		0.085		0.214	0.134	0.126	0.047
358.0	0.051		0		0		0		0		0		0		0.042		0.051	0.012	0.000	0.022
363.0	0.069		0.039		0.064		0.040		0.194<		0		0.082		0.081		0.194	0.071	0.067	0.057
367.0	0.081		0.078		0.028		0		0.103		0		0.015		0.053		0.103	0.045	0.041	0.040
372.0	0.100		0.124		0.022		0.052		0.056		0.046		0.032		0.051		0.124	0.060	0.052	0.034
375.0	0.095		0.042		0.047		0.093		0.061		0.067		0.070		0.063		0.095	0.067	0.065	0.019
377.5	0.135		0.156		0.087		0.080		0.140		0.083		0.060		0		0.156	0.093	0.085	0.051

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

RSRM-1B Aft Cylinder Insulation Performance (Cont'd)

Table 22 (Cont'd)

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION	DEGREE LOCATION																EXPOSURE
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	AVERAGE	TIME
56.0	10.9	9.0	12.0	8.6	13.4	11.2	10.7	10.9	11.8	12.0	9.5	8.8	10.6	11.4	10.7	11.2	10.8	74.6
68.0	9.2	20.1	12.1	8.8	10.5	12.9	12.2	11.7	8.3	12.2	11.2	6.7	10.4	10.2	10.2	10.8	11.1	63.2
72.0	8.5	20.1	10.4	6.2	7.8	8.8	11.8	8.7	8.6	8.5	3.9	5.9	10.5	7.2	10.7	9.7	9.2	56.6
75.0	8.6	8.8	9.1	7.3	10.8	8.5	9.6	9.6	8.3	9.4	3.0	9.9	4.2	6.5	8.3	9.1	8.2	50.8
78.0	8.5	8.8	9.4	7.2	8.2	8.2	8.8	9.8	8.8	9.9	2.0	10.8	4.1	5.6	8.0	10.5	8.1	46.6
81.0	6.8	7.7	8.0	5.9	7.5	7.7	8.7	9.6	8.2	9.3	1.6	6.1	4.5	5.8	7.9	9.0	7.1	45.8
85.0	7.3	8.5	7.8	8.7	8.5	8.4	8.8	9.9	9.6	9.6	3.9	8.4	4.8	7.1	8.2	9.0	8.0	45.2
90.0	8.0	9.2	8.5	9.2	8.5	8.4	9.1	10.9	8.3	10.1	6.1	8.8	9.7	8.1	8.7	9.2	8.8	44.6
98.0	8.6	9.2	12.1	8.9	7.2	9.2	10.1	10.3	10.8	10.2	6.5	9.8	10.0	8.8	9.2	8.5	9.3	43.6
105.8	9.5		13.1		9.2		10.4		8.0		9.4		8.7		8.4		9.6	42.8
116.0	8.3		8.3		8.6		8.8		8.3		8.2		7.3		7.8		8.2	42.0
124.5	9.1		8.8		9.5		9.5		8.7		8.5		6.5		8.8		8.7	41.0
133.0	9.1		9.1		10.3		10.7		10.4		9.4		8.6		9.9		9.7	39.8
145.5	8.3		10.1		9.0		11.3		10.4		10.2		9.2		9.0		9.7	37.8
158.5	8.8		9.8		9.0		9.3		10.1		8.4		7.6		8.5		8.9	36.2
168.3	5.4		8.8		7.5		9.1		7.8		7.8		5.7		8.3		7.5	34.8
177.7	10.8		11.2		10.6		10.3		11.7		10.4		9.4		10.9		10.7	34.4
192.5	9.3		10.5		9.5		9.8		9.2		9.6		7.5		8.8		9.3	31.2
202.5	6.9		6.9		7.1		7.3		6.9		6.9		5.8		5.5		6.7	39.8
214.0	9.2		8.1		9.1		10.0		9.3		10.0		7.6		6.1		8.7	28.0
227.3	10.2		9.1		9.4		11.6		10.8		12.3		7.1		7.5		9.8	26.0
238.3	9.0		8.3		9.3		8.9		10.0		9.0		8.2		9.2		9.0	24.4
250.0	9.0		8.1		8.4		9.1		9.1		9.6		8.3		7.9		8.7	22.4
267.0	7.8		7.6		9.0		8.6		8.7		9.6		7.6		9.3		8.5	19.8
283.9	9.6		6.4		7.2		10.9		9.5		7.5		9.2		15.1		9.4	17.0
299.1	10.1		8.9		9.7		10.6		7.8		10.4		6.2		15.9		10.0	17.6
322.0	5.2		6.5		5.5		8.3		6.1		7.0		4.0		6.3		6.1	12.8
339.0	6.2		4.0		4.0		5.9		6.6		6.1		5.3		6.5		5.6	12.2
344.0	11.1		9.6		14.5		17.5		9.0		6.1		12.7		7.0		10.9	12.2
358.0	4.5		0		0		0		0		0		0		3.7		1.0	11.4
363.0	6.1		3.4		5.6		3.5		17.0		0		7.2		7.1		6.2	11.4
367.0	7.4		7.1		2.5		0		9.4		0		1.4		4.8		4.1	11.0
372.0	6.3		7.8		1.4		3.3		3.5		2.9		2.0		3.2		3.8	15.8
375.0	4.9		2.2		2.4		4.8		3.2		3.5		3.6		3.3		3.5	19.2
377.5	6.6		7.6		4.3		3.9		6.9		4.1		2.9		0		4.5	20.4

RSRM-1B Aft Cylinder Insulation Performance (Cont'd)

Table 22 (Cont'd)

RSRM 1-B Aft Cylinder
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MIN.	MEDIAN	STANDARD DEVIATION	MDT
56.0	3.540	3.447	3.468	3.298	3.504	3.487	3.498	3.417	3.501	3.550	3.429	3.434	3.466	3.440	3.462	3.416	3.298	3.464	0.059	2.790
68.0	2.799	3.464	2.888	2.751	2.767	2.912	2.819	2.777	2.744	2.890	2.828	2.587	2.861	2.675	2.748	2.645	2.587	2.788	0.193	2.200
72.0	2.142	2.867	2.156	2.204	2.142	2.146	2.270	2.121	2.142	2.171	2.113	2.142	2.399	2.100	2.250	2.150	2.100	2.148	0.188	2.000
75.0	1.986	1.926	1.949	2.047	2.125	1.978	1.979	1.982	2.012	1.986	1.948	2.122	1.906	1.888	1.948	2.020	1.888	1.980	0.067	1.800
78.0	1.745	1.707	1.738	1.740	1.751	1.722	1.716	1.750	1.754	1.764	1.725	1.871	1.755	1.678	1.702	1.771	1.678	1.743	0.042	1.600
81.0	1.570	1.501	1.552	1.517	1.631	1.493	1.541	1.527	1.553	1.588	1.526	1.525	1.606	1.496	1.521	1.576	1.493	1.534	0.040	1.400
85.0	1.535	1.541	1.550	1.568	1.597	1.540	1.552	1.594	1.603	1.585	1.541	1.572	1.564	1.524	1.542	1.543	1.524	1.551	0.025	1.300
90.0	1.501	1.484	1.450	1.470	1.549	1.430	1.443	1.497	1.500	1.488	1.495	1.479	1.660	1.459	1.474	1.450	1.430	1.482	0.054	1.265
98.0	1.525	1.562	1.670	1.529	1.528	1.528	1.606	1.597	1.652	1.603	1.601	1.600	1.612	1.589	1.590	1.504	1.504	1.594	0.048	1.135
105.8	1.147		1.294		1.119		1.122		1.115		1.107		1.124		1.099		1.099	1.120	0.063	1.080
116.0	1.107		1.068		1.091		1.089		1.086		1.065		1.071		1.075		1.065	1.081	0.014	1.050
124.5	1.077		1.058		1.122		1.070		1.072		1.054		1.063		1.066		1.054	1.068	0.021	1.030
133.0	1.169		1.252		1.238		1.186		1.133		1.107		1.118		1.194		1.107	1.178	0.054	0.980
145.5	0.946		0.944		0.949		0.939		0.964		0.941		0.930		0.934		0.930	0.942	0.010	0.930
158.5	0.886		0.902		0.891		0.907		0.919		0.925		0.887		0.902		0.886	0.902	0.014	0.880
168.3	1.110		1.149		1.029		1.037		1.055		1.110		1.091		1.112		1.029	1.100	0.042	0.850
177.7	1.522		1.520		1.515		1.529		1.511		1.487		1.505		1.517		1.487	1.516	0.013	1.000
192.5	0.920		0.930		0.907		0.917		0.907		0.892		0.895		0.916		0.892	0.912	0.013	0.780
202.5	0.734		0.731		0.746		0.733		0.737		0.732		0.731		0.735		0.731	0.734	0.005	0.730
214.0	0.705		0.705		0.701		0.710		0.712		0.704		0.702		0.706		0.701	0.705	0.004	0.700
227.3	0.805		0.745		0.766		0.813		0.787		0.773		0.748		0.826		0.745	0.780	0.030	0.650
238.3	0.648		0.644		0.667		0.634		0.663		0.639		0.652		0.642		0.634	0.646	0.012	0.530
250.0	0.563		0.552		0.551		0.551		0.575		0.558		0.573		0.556		0.551	0.557	0.010	0.550
267.0	0.516		0.523		0.536		0.511		0.527		0.536		0.528		0.519		0.511	0.525	0.009	0.500
283.9	0.547		0.479		0.482		0.506		0.490		0.462		0.519		0.661		0.462	0.498	0.063	0.450
299.1	1.062		1.070		1.074		1.051		1.041		1.070		1.078		1.167		1.041	1.070	0.039	0.670
322.0	0.405		0.406		0.389		0.389		0.393		0.392		0.395		0.391		0.389	0.393	0.007	0.380
339.0	0.404		0.402		0.389		0.387		0.391		0.391		0.392		0.394		0.387	0.391	0.006	0.380
344.0	0.528		0.502		0.540		0.557		0.413		0.421		0.517		0.465		0.413	0.510	0.054	0.380
358.0	0.406		0.411		0.403		0.393		0.406		0.403		0.411		0.401		0.393	0.405	0.006	0.380
363.0	0.522		0.507		0.519		0.560		0.646		0.530		0.560		0.500		0.500	0.526	0.047	0.380
367.0	0.460		0.464		0.417		0.432		0.503		0.432		0.423		0.430		0.417	0.432	0.029	0.380
372.0	0.469		0.506		0.409		0.468		0.417		0.424		0.417		0.423		0.409	0.424	0.035	0.400
375.0	0.564		0.511		0.498		0.511		0.511		0.530		0.548		0.516		0.498	0.513	0.022	0.480
377.5	0.748		0.736		0.645		0.746		0.682		0.640		0.660		0.532		0.532	0.671	0.073	0.530

RSRM-1B Aft Cylinder Insulation Performance (Cont'd)

Table 22 (Cont'd)

POSTFIRE MEASUREMENTS

STATION	DEGREE LOCATION																		STANDARD
(IN)	0.0	21.6	46.8	68.4	90.0	111.6	136.8	158.4	180.0	201.6	226.8	248.4	270.0	291.6	316.8	338.4	MINIMUM	MEDIAN	DEVIATION
56.0	2.724	2.772	2.572	2.657	2.506	2.651	2.699	2.607	2.618	2.658	2.717	2.774	2.674	2.591	2.663	2.584	2.506	2.658	0.073
68.0	2.215	2.191	2.126	2.196	2.104	2.098	2.051	2.037	2.217	2.116	2.123	2.162	2.203	2.030	2.104	1.964	1.964	2.119	0.074
72.0	1.662	1.730	1.567	1.854	1.701	1.649	1.603	1.629	1.655	1.690	1.890	1.807	1.805	1.692	1.644	1.602	1.567	1.676	0.095
75.0	1.551	1.477	1.486	1.675	1.578	1.546	1.492	1.492	1.588	1.509	1.798	1.617	1.691	1.560	1.527	1.557	1.477	1.554	0.088
78.0	1.347	1.297	1.299	1.403	1.368	1.338	1.304	1.293	1.344	1.302	1.631	1.366	1.566	1.415	1.328	1.284	1.284	1.341	0.099
81.0	1.257	1.150	1.185	1.245	1.286	1.141	1.141	1.089	1.176	1.162	1.453	1.245	1.402	1.231	1.161	1.163	1.089	1.181	0.097
85.0	1.207	1.156	1.198	1.176	1.213	1.162	1.155	1.147	1.170	1.151	1.365	1.192	1.349	1.204	1.171	1.136	1.136	1.174	0.067
90.0	1.145	1.072	1.070	1.061	1.168	1.056	1.038	1.009	1.128	1.038	1.222	1.085	1.228	1.096	1.087	1.040	1.009	1.079	0.065
98.0	1.151	1.160	1.143	1.142	1.213	1.126	1.164	1.148	1.179	1.157	1.318	1.172	1.178	1.207	1.189	1.133	1.126	1.162	0.046
105.8	0.742		0.735		0.727		0.675		0.771		0.705		0.750		0.738		0.675	0.737	0.029
116.0	0.757		0.721		0.729		0.718		0.736		0.721		0.763		0.746		0.718	0.733	0.017
124.5	0.704		0.699		0.731		0.681		0.716		0.707		0.798		0.704		0.681	0.706	0.035
133.0	0.807		0.890		0.827		0.759		0.719		0.732		0.774		0.800		0.719	0.787	0.055
145.5	0.632		0.564		0.610		0.512		0.569		0.554		0.584		0.593		0.512	0.576	0.037
158.5	0.567		0.546		0.564		0.570		0.554		0.620		0.613		0.595		0.546	0.568	0.027
168.3	0.923		0.842		0.769		0.722		0.782		0.838		0.892		0.824		0.722	0.831	0.066
177.7	1.151		1.135		1.149		1.174		1.109		1.129		1.180		1.143		1.109	1.146	0.023
192.5	0.629		0.603		0.612		0.612		0.619		0.591		0.660		0.640		0.591	0.616	0.022
202.5	0.460		0.455		0.463		0.441		0.461		0.459		0.500		0.517		0.441	0.461	0.025
214.0	0.448		0.479		0.445		0.431		0.453		0.423		0.490		0.535		0.423	0.451	0.037
227.3	0.540		0.509		0.522		0.511		0.505		0.453		0.563		0.631		0.453	0.516	0.052
238.3	0.428		0.442		0.441		0.417		0.419		0.420		0.452		0.418		0.417	0.424	0.014
250.0	0.361		0.371		0.363		0.348		0.371		0.344		0.388		0.379		0.344	0.367	0.015
267.0	0.361		0.372		0.358		0.340		0.355		0.346		0.377		0.335		0.335	0.356	0.015
283.9	0.384		0.370		0.360		0.321		0.329		0.335		0.362		0.404		0.321	0.361	0.029
299.1	0.884		0.913		0.903		0.864		0.903		0.887		0.969		0.888		0.864	0.896	0.031
322.0	0.338		0.323		0.318		0.283		0.315		0.303		0.344		0.311		0.283	0.317	0.019
339.0	0.328		0.353		0.340		0.315		0.311		0.317		0.327		0.315		0.311	0.322	0.015
344.0	0.393		0.385		0.363		0.343		0.303		0.346		0.362		0.380		0.303	0.363	0.029
358.0	0.355		0.430		0.446		0.450		0.467		0.495		0.423		0.359		0.355	0.438	0.049
363.0	0.453		0.468		0.455		0.520		0.452		0.536		0.478		0.419		0.419	0.462	0.038
367.0	0.379		0.386		0.389		0.454		0.400		0.458		0.408		0.377		0.377	0.395	0.032
372.0	0.369		0.382		0.387		0.416		0.361		0.378		0.385		0.372		0.361	0.380	0.017
375.0	0.469		0.469		0.451		0.418		0.450		0.463		0.478		0.453		0.418	0.458	0.018
377.5	0.613		0.580		0.558		0.666		0.542		0.557		0.600		0.614		0.542	0.590	0.041

RSRM-1B Aft Cylinder Insulation Performance (Cont'd)

Table 22 (Cont'd)

RSRM 1-B Aft Center
COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
3.5	5.11	5.64	3.42	3.91	3.81	4.80	4.31	4.88	3.42	90.0	2.0
11.0	3.87	6.83	4.50	3.59	3.20	2.35	3.17	3.24	2.35	226.0	1.5
23.6	2.62	3.32	4.45	3.84	3.48	4.10	3.97	3.97	2.62	0.0	1.5
30.7	3.61	2.99	4.12	2.91	3.46	3.54	3.81	3.14	2.91	136.0	1.5
36.2	3.61	3.71	3.64	2.60	3.61	2.81	3.61	4.44	2.60	136.0	1.5
39.7	4.22	3.98	4.10	3.09	5.66	3.28	4.34	5.38	3.09	136.0	1.5
44.6	9.00	5.63	5.63	3.67	7.20	4.24	8.18	6.00	3.67	136.0	1.5
48.0	4.72	2.82	3.56	3.31	4.97	2.82	15.16	2.55	2.55	316.0	1.5
71.5	2.88	3.70	2.24	2.58	2.74	2.50	2.88	5.86	2.24	90.0	1.5
126.0	9.38	10.71	+	2.59	+	+	3.13	16.67	2.59	136.0	1.5
153.5	16.25	2.32	2.55	2.03	2.41	2.89	6.19	3.82	2.03	136.0	1.5
161.4	+	+	11.24	5.13	12.42	4.92	+	6.21	4.92	226.0	2.0
214.1	3.94	5.91	4.64	8.12	+	14.44	4.06	3.17	3.17	316.0	1.5
280.0	5.29	+	+	+	+	+	+	+	5.29	0.0	1.5
298.0	+	+	+	+	+	+	+	+			1.5
307.8	+	+	+	2.65	+	+	+	+	2.65	136.0	1.5
311.8	5.29	+	+	3.33	3.21	3.00	+	+	3.00	226.0	1.5
314.0	3.91	+	+	6.92	9.00	+	+	+	3.91	0.0	1.5

SEGMENT MINIMUM = 2.03 AT THE 153.5 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE
3.5	6.54	7.35	4.67	5.10	4.88	6.11	5.56	6.55	4.67	90.0
11.0	4.20	7.18	4.72	3.82	3.52	2.77	3.54	3.55	2.77	226.0
23.6	3.40	3.67	4.82	4.16	3.82	4.26	4.36	4.21	3.40	0.0
30.7	3.92	3.25	4.47	3.16	3.78	3.78	4.21	3.43	3.16	136.0
36.2	4.20	4.33	4.45	3.09	4.31	3.39	4.34	5.12	3.09	136.0
39.7	4.47	4.31	4.44	3.37	6.14	3.47	4.66	5.73	3.37	136.0
44.6	9.05	5.67	5.63	3.73	7.26	4.29	8.43	6.07	3.73	136.0
48.0	6.34	3.79	4.31	4.00	6.07	3.80	18.63	3.57	3.57	316.0
71.5	3.07	3.89	2.46	2.92	3.15	2.87	3.31	6.17	2.46	90.0
126.0	11.19	11.64	+	4.22	+	+	3.62	19.56	3.62	270.0
153.5	21.12	3.12	3.55	2.66	3.44	3.64	8.29	5.18	2.66	136.0
161.4	+	+	24.19	11.85	26.89	11.42	+	13.37	11.42	226.0
214.1	4.39	6.64	5.21	9.25	+	16.44	4.59	3.68	3.68	316.0
280.0	7.00	+	+	+	+	+	+	+	7.00	0.0
298.0	+	+	+	+	+	+	+	+		
307.8	+	+	+	3.38	+	+	+	+	3.38	136.0
311.8	7.00	+	+	4.22	4.11	3.90	+	+	3.90	226.0
314.0	4.91	+	+	9.08	11.30	+	+	+	4.91	0.0

SEGMENT MINIMUM = 2.46 AT THE 71.5 INCH STATION.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1B Aft Center Segment Insulation Performance

Table 23

RSRM 1-B Aft Center
MATERIAL DECOMPOSITION DEPTH (MDD)
INCHES

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION
3.5	0.415	0.376	0.619	0.542	0.556	0.442	0.492	0.434	0.619	0.485	0.467	0.082
11.0	0.491	0.278	0.422	0.529	0.593	0.808	0.600	0.587	0.808	0.539	0.558	0.154
23.6	0.355	0.290	0.209	0.242	0.267	0.227	0.234	0.234	0.355	0.256	0.238	0.046
30.7	0.208	0.251	0.182	0.258	0.217	0.212	0.197	0.239	0.258	0.221	0.214	0.027
36.2	0.155	0.151	0.154	0.215	0.155	0.199	0.155	0.126	0.215	0.164	0.155	0.029
39.7	0.102	0.108	0.105	0.139	0.076	0.131	0.099	0.080	0.139	0.105	0.104	0.022
44.6	0.040	0.064	0.064	0.098<	0.050	0.085	0.044	0.060	0.098	0.063	0.062	0.020
48.0	0.061	0.102<	0.081	0.087	0.058	0.102<	0.019	0.113<	0.113	0.078	0.084	0.031
71.5	0.059	0.046	0.076	0.066	0.062	0.068	0.059	0.029	0.076	0.058	0.060	0.015
126.0	0.016	0.014	0	0.058	0	0	0.048	0.009	0.058	0.018	0.012	0.023
153.5	0.008	0.056	0.051	0.064<	0.054	0.045	0.021	0.034	0.064	0.042	0.048	0.019
161.4	0	0	0.021	0.046	0.019	0.048	0	0.038	0.048	0.021	0.020	0.021
214.1	0.033<	0.022	0.028	0.016	0	0.009	0.032<	0.041<	0.041	0.023	0.025	0.014
280.0	0.017<	0	0	0	0	0	0	0	0.017	0.002	0.000	0.006
298.0	0	0	0	0	0	0	0	0				
307.8	0	0	0	0.034<	0	0	0	0	0.034	0.004	0.000	0.012
311.8	0.017<	0	0	0.027<	0.028<	0.030<	0	0	0.030	0.013	0.009	0.014
314.0	0.023<	0	0	0.013<	0.010<	0	0	0	0.023	0.006	0.000	0.009

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)
MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVERAGE	EXPOSURE TIME
3.5	3.7	3.3	5.5	4.8	4.9	3.9	4.4	3.9	4.3	112.6
11.0	5.0	2.8	4.3	5.4	6.1	8.3	6.1	6.0	5.5	97.7
23.6	5.4	4.2	3.2	3.7	4.0	3.4	3.5	3.5	3.9	66.0
30.7	4.4	5.3	3.8	5.4	4.6	4.5	4.1	5.0	4.6	47.6
36.2	4.8	4.6	4.7	6.6	4.8	6.1	4.8	3.9	5.0	32.6
39.7	4.6	4.9	4.7	6.3	3.4	5.9	4.5	3.6	4.7	22.2
44.6	3.3	5.3	5.3	8.2	4.2	7.1	3.7	5.0	5.3	12.0
48.0	5.4	9.0	7.2	7.7	5.1	9.0	1.7	10.0	6.9	11.3
71.5	5.8	4.5	7.5	6.5	6.1	6.7	5.8	2.8	5.7	10.2
126.0	1.8	1.6	0	6.6	0	0	5.5	1.0	2.1	8.8
153.5	1.0	7.2	6.5	8.2	6.9	5.8	2.7	4.4	5.3	7.8
161.4	0	0	2.1	4.6	1.9	4.8	0	3.8	2.1	10.0
214.1	5.5	3.7	4.7	2.7	0	1.5	5.3	6.8	3.8	6.0
280.0	5.0	0	0	0	0	0	0	0	0.6	3.4
298.0	0	0	0	0	0	0	0	0		2.8
307.8	0	0	0	17.0	0	0	0	0	2.1	2.0
311.8	8.5	0	0	13.5	14.0	15.0	0	0	6.4	2.0
314.0	38.3	0	0	21.7	16.7	0	0	0	9.6	0.6

RSRM-1B Aft Center Segment Insulation Performance (Cont'd)

Table 23 (Cont'd)

RSRM 1-B Aft Center
PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION	MDT
3.5	2.716	2.762	2.892	2.762	2.713	2.701	2.736	2.844	2.701	2.749	0.068	2.120
11.0	2.063	1.996	1.993	2.019	2.088	2.238	2.122	2.086	1.993	2.075	0.080	1.900
23.6	1.208	1.027	1.008	1.006	1.020	0.966	1.021	0.984	0.966	1.014	0.075	0.930
30.7	0.816	0.817	0.813	0.815	0.820	0.801	0.829	0.820	0.801	0.817	0.008	0.750
36.2	0.651	0.654	0.686	0.664	0.668	0.674	0.673	0.645	0.645	0.666	0.014	0.560
39.7	0.456	0.466	0.466	0.469	0.467	0.455	0.461	0.458	0.455	0.463	0.005	0.430
44.6	0.362	0.363	0.360	0.366	0.363	0.365	0.371	0.364	0.360	0.363	0.003	0.360
48.0	0.387	0.387	0.349	0.348	0.352	0.388	0.354	0.403	0.348	0.370	0.022	0.288
71.5	0.181	0.179	0.187	0.193	0.195	0.195	0.195	0.179	0.179	0.190	0.007	0.170
126.0	0.179	0.163	0.171	0.245	0.173	0.172	0.174	0.176	0.163	0.174	0.026	0.150
153.5	0.169	0.175	0.181	0.170	0.186	0.164	0.174	0.176	0.164	0.175	0.007	0.130
161.4	0.511	0.503	0.508	0.545	0.511	0.548	0.545	0.508	0.503	0.511	0.020	0.236
214.1	0.145	0.146	0.146	0.148	0.147	0.148	0.147	0.151	0.145	0.147	0.002	0.130
280.0	0.119	0.113	0.111	0.118	0.117	0.117	0.114	0.115	0.111	0.116	0.003	0.090
298.0	0.115	0.113	0.113	0.118	0.116	0.113	0.110	0.206	0.110	0.114	0.033	0.090
307.8	0.119	0.110	0.118	0.115	0.121	0.116	0.109	0.118	0.109	0.117	0.004	0.090
311.8	0.119	0.109	0.114	0.114	0.115	0.117	0.102	0.111	0.102	0.114	0.005	0.090
314.0	0.113	0.113	0.112	0.118	0.113	0.119	0.104	0.104	0.104	0.113	0.006	0.090

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION
3.5	2.301	2.386	2.273	2.220	2.157	2.259	2.244	2.410	2.157	2.266	0.084
11.0	1.572	1.718	1.571	1.490	1.495	1.430	1.522	1.499	1.430	1.510	0.086
23.6	0.853	0.747	0.799	0.764	0.753	0.739	0.787	0.750	0.739	0.759	0.038
30.7	0.608	0.566	0.631	0.557	0.603	0.589	0.632	0.581	0.557	0.596	0.028
36.2	0.496	0.503	0.532	0.449	0.513	0.475	0.518	0.519	0.449	0.508	0.027
39.7	0.354	0.358	0.361	0.330	0.391	0.324	0.362	0.378	0.324	0.360	0.022
44.6	0.322	0.299	0.296	0.268	0.313	0.280	0.327	0.304	0.268	0.301	0.020
48.0	0.326	0.285	0.268	0.261	0.294	0.286	0.335	0.290	0.261	0.288	0.026
71.5	0.122	0.133	0.111	0.127	0.133	0.127	0.136	0.150	0.111	0.130	0.011
126.0	0.163	0.149	0.172	0.187	0.173	0.188	0.126	0.167	0.126	0.170	0.020
153.5	0.161	0.119	0.130	0.106	0.132	0.119	0.153	0.142	0.106	0.131	0.018
161.4	0.529	0.509	0.487	0.499	0.492	0.500	0.555	0.470	0.470	0.500	0.026
214.1	0.112	0.124	0.118	0.132	0.161	0.139	0.115	0.110	0.110	0.121	0.017
280.0	0.102	L	L	L	L	L	L	L	0.102	0.115	0.005
298.0	0.178	L	L	L	L	L	L	L	0.110	0.115	0.037
307.8	L	L	L	0.081	L	L	L	L	0.081	0.117	0.013
311.8	0.102	L	L	0.087	0.087	0.087	L	L	0.087	0.102	0.011
314.0	0.090	L	L	0.105	0.103	L	L	L	0.090	0.105	0.009

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

RSRM-1B Aft Center Segment Insulation Performance (Cont'd)

Table 23 (Cont'd)

RSRM-1B FORWARD CENTER SEGMENT

COMPLIANCE SAFETY FACTOR (CSF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE	REQUIRED SAFETY FACTOR
3.5	11.16	8.41	8.83	5.84	7.11	8.65	7.97	8.22	5.84	136.0	2.0
11.0	23.17	79.17	8.30	25.33	9.36	+	55.88	35.85	8.30	90.0	1.5
23.6	5.41	4.95	7.88	9.21	7.38	10.69	9.12	+	4.95	46.0	1.5
30.7	5.77	+	6.88	6.94	6.64	6.76	8.43	11.19	5.77	0.0	1.5
36.2	10.77	+	7.89	6.02	8.62	4.71	11.91	5.28	4.71	226.0	1.5
39.7	4.17	6.06	2.39	7.54	5.81	4.34	2.62	8.43	2.39	90.0	1.5
44.6	51.43	+	12.41	10.59	9.73	51.43	9.47	15.65	9.47	270.0	1.5
48.0	3.35	57.60	12.52	22.15	10.67	+	3.13	14.40	3.13	270.0	1.5
71.5	12.14	10.00	6.54	3.86	+	+	5.86	28.33	3.86	136.0	1.5
126.0	50.00	+	+	37.50	8.33	+	+	4.69	4.69	316.0	1.5
153.5	5.91	+	13.00	14.44	4.19	+	2.32	+	2.32	270.0	1.5
161.4	14.75	+	+	13.88	21.45	+	+	+	13.88	136.0	2.0
214.1	7.22	21.67	9.29	18.57	10.83	+	+	+	7.22	0.0	1.5
280.0	+	+	+	+	+	+	+	+			1.5
298.0	+	+	+	+	+	+	+	+			1.5
307.8	+	+	+	+	+	+	+	+			1.5
311.8	+	+	+	+	+	+	+	+			1.5
314.0	+	+	+	+	+	+	+	+			1.5

SEGMENT MINIMUM = 2.32 AT THE 153.5 INCH STATION.

ACTUAL SAFETY FACTOR (ASF)

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	PLANE
3.5	13.53	10.42	11.37	7.63	9.21	10.99	10.05	10.43	7.63	136.0
11.0	26.59	85.38	9.97	28.24	11.30	+	62.38	41.11	9.97	90.0
23.6	6.74	6.56	9.88	11.27	8.98	12.97	10.84	+	6.56	46.0
30.7	6.73	+	7.50	7.75	7.50	7.86	9.65	13.06	6.73	0.0
36.2	13.04	+	9.54	7.30	10.20	5.76	13.98	6.39	5.76	226.0
39.7	4.93	6.68	3.23	8.56	6.01	5.28	3.44	9.02	3.23	90.0
44.6	53.57	+	12.69	11.65	9.84	52.71	9.92	16.00	9.84	180.0
48.0	4.64	70.20	15.52	27.15	12.56	+	4.61	17.75	4.61	270.0
71.5	13.57	11.06	7.12	4.32	+	+	6.52	31.00	4.32	136.0
126.0	51.00	+	+	38.50	8.83	+	+	5.91	5.91	316.0
153.5	8.14	+	16.00	17.56	5.39	+	3.52	+	3.52	270.0
161.4	32.81	+	+	30.06	45.82	+	+	+	30.06	136.0
214.1	7.56	22.50	9.71	20.43	11.00	+	+	+	7.56	0.0
280.0	+	+	+	+	+	+	+	+		
298.0	+	+	+	+	+	+	+	+		
307.8	+	+	+	+	+	+	+	+		
311.8	+	+	+	+	+	+	+	+		
314.0	+	+	+	+	+	+	+	+		

SEGMENT MINIMUM = 3.23 AT THE 39.7 INCH STATION.
A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

RSRM-1B Forward Center Segment Insulation Performance

Table 24

RSRM-1B FORWARD CENTER SEGMENT

MATERIAL DECOMPOSITION DEPTH (MDD)

INCHES

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION
3.5	0.190	0.252	0.240	0.363	0.298	0.245	0.266	0.258	0.363	0.264	0.255	0.050
11.0	0.082	0.024	0.229	0.075	0.203	0.011	0.034	0.053	0.229	0.089	0.064	0.082
23.6	0.172	0.188	0.118	0.101	0.126	0.087	0.102	0	0.188	0.112	0.110	0.057
30.7	0.130	0.006	0.109	0.108	0.113	0.111	0.089	0.067	0.130	0.092	0.109	0.039
36.2	0.052	0	0.071	0.093	0.065	0.119	0.047	0.106	0.119	0.069	0.068	0.038
39.7	0.103	0.071	0.180	0.057	0.074	0.099	0.164	0.051	0.180	0.100	0.087	0.048
44.6	0.007	0	0.029	0.034	0.037	0.007	0.038	0.023	0.038	0.022	0.026	0.015
48.0	0.086	0.005	0.023	0.013	0.027	0	0.092 <	0.020	0.092	0.033	0.022	0.036
71.5	0.014	0.017	0.026	0.044	0	0	0.029	0.006	0.044	0.017	0.016	0.015
126.0	0.003	0	0	0.004	0.018	0	0	0.032	0.032	0.007	0.002	0.012
153.5	0.022	0	0.010	0.009	0.031	0	0.056	0	0.056	0.016	0.009	0.020
161.4	0.016	0	0	0.017	0.011	0	0	0	0.017	0.005	0.000	0.008
214.1	0.018	0.006	0.014	0.007	0.012	0	0	0	0.018	0.007	0.007	0.007
280.0	0	0	0	0	0	0	0	0				
298.0	0	0	0	0	0	0	0	0				
307.8	0	0	0	0	0	0	0	0				
311.8	0	0	0	0	0	0	0	0				
314.0	0	0	0	0	0	0	0	0				

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

MATERIAL DECOMPOSITION RATE (MDR)

MILS / SECOND

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	AVERAGE	EXPOSURE TIME
3.5	1.7	2.2	2.1	3.2	2.6	2.2	2.4	2.3	2.3	112.8
11.0	0.8	0.2	2.3	0.8	2.1	0.1	0.3	0.5	0.9	98.1
23.6	2.6	2.8	1.8	1.5	1.9	1.3	1.5	0	1.7	66.6
30.7	2.7	0.1	2.3	2.3	2.4	2.3	1.9	1.4	1.9	48.0
36.2	1.6	0	2.1	2.8	2.0	3.6	1.4	3.2	2.1	33.2
39.7	4.5	3.1	7.9	2.5	3.2	4.3	7.2	2.2	4.4	22.8
44.6	0.5	0	2.3	2.7	2.9	0.5	3.0	1.8	1.7	12.8
48.0	7.1	0.4	1.9	1.1	2.2	0	7.6	1.7	2.7	12.1
71.5	1.3	1.5	2.4	4.0	0	0	2.6	0.5	1.5	11.0
126.0	0.3	0	0	0.4	1.9	0	0	3.3	0.7	9.6
153.5	2.5	0	1.1	1.0	3.5	0	6.4	0	1.8	8.8
161.4	1.5	0	0	1.6	1.0	0	0	0	0.5	10.8
214.1	2.5	0.8	1.9	1.0	1.7	0	0	0	1.0	7.2
280.0	0	0	0	0	0	0	0	0		4.2
298.0	0	0	0	0	0	0	0	0		4.0
307.8	0	0	0	0	0	0	0	0		3.4
311.8	0	0	0	0	0	0	0	0		3.4
314.0	0	0	0	0	0	0	0	0		0.6

RSRM-1B Forward Center Segment Insulation Performance (Cont'd)

Table 24 (Cont'd)

RSRM-1B FORWARD CENTER SEGMENT

PREFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION	MDT
3.5	2.570	2.625	2.729	2.770	2.745	2.692	2.672	2.690	2.570	2.691	0.065	2.120
11.0	2.180	2.049	2.284	2.118	2.294	2.054	2.121	2.179	2.049	2.150	0.093	1.900
23.6	1.159	1.234	1.166	1.138	1.132	1.128	1.106	1.020	1.020	1.135	0.060	0.930
30.7	0.875	0.855	0.818	0.837	0.847	0.873	0.859	0.875	0.818	0.857	0.020	0.750
36.2	0.678	0.658	0.677	0.679	0.663	0.686	0.657	0.677	0.657	0.677	0.011	0.560
39.7	0.508	0.474	0.582	0.488	0.445	0.523	0.564	0.460	0.445	0.498	0.049	0.430
44.6	0.375	0.366	0.368	0.396	0.364	0.369	0.377	0.368	0.364	0.368	0.010	0.360
48.0	0.399	0.351	0.357	0.353	0.339	0.349	0.424	0.355	0.339	0.354	0.029	0.288
71.5	0.190	0.188	0.185	0.190	0.189	0.188	0.189	0.186	0.185	0.189	0.002	0.170
126.0	0.153	0.153	0.152	0.154	0.159	0.151	0.156	0.189	0.151	0.154	0.013	0.150
153.5	0.179	0.155	0.160	0.158	0.167	0.161	0.197	0.157	0.155	0.161	0.014	0.130
161.4	0.525	0.524	0.505	0.511	0.504	0.528	0.512	0.537	0.504	0.518	0.012	0.236
214.1	0.136	0.135	0.136	0.143	0.132	0.130	0.134	0.134	0.130	0.135	0.004	0.130
280.0	0.116	0.106	0.115	0.116	0.113	0.110	0.110	0.114	0.106	0.113	0.004	0.090
298.0	0.204	0.214	0.205	0.212	0.207	0.217	0.209	0.199	0.199	0.208	0.006	0.090
307.8	0.207	0.113	0.108	0.110	0.116	0.111	0.212	0.207	0.108	0.115	0.050	0.090
311.8	0.211	0.111	0.107	0.112	0.109	0.107	0.204	0.207	0.107	0.112	0.051	0.090
314.0	0.216	0.110	0.109	0.106	0.107	0.111	0.214	0.213	0.106	0.111	0.055	0.090

POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 0.0	46.0	90.0	136.0	180.0	226.0	270.0	316.0	MINIMUM	MEDIAN	STANDARD DEVIATION
3.5	2.380	2.373	2.489	2.407	2.447	2.447	2.406	2.432	2.373	2.420	0.039
11.0	2.098	2.025	2.055	2.043	2.091	2.043	2.087	2.126	2.025	2.071	0.035
23.6	0.987	1.046	1.048	1.037	1.006	1.041	1.004	1.053	0.987	1.039	0.025
30.7	0.745	0.849	0.709	0.729	0.734	0.762	0.770	0.808	0.709	0.754	0.046
36.2	0.626	0.675	0.606	0.586	0.598	0.567	0.610	0.571	0.567	0.602	0.035
39.7	0.405	0.403	0.402	0.431	0.371	0.424	0.400	0.409	0.371	0.404	0.018
44.6	0.368	0.366	0.339	0.362	0.327	0.362	0.339	0.345	0.327	0.354	0.015
48.0	0.313	0.346	0.334	0.340	0.312	0.359	0.332	0.335	0.312	0.335	0.016
71.5	0.176	0.171	0.159	0.146	0.197	0.198	0.160	0.180	0.146	0.174	0.018
126.0	0.150	0.218	0.160	0.150	0.141	0.174	0.166	0.157	0.141	0.159	0.024
153.5	0.157	0.162	0.150	0.149	0.136	0.182	0.141	0.169	0.136	0.154	0.015
161.4	0.509	0.530	0.519	0.494	0.493	0.539	0.524	0.552	0.493	0.521	0.021
214.1	0.118	0.129	0.122	0.136	0.120	L	0.155	L	0.118	0.130	0.012
280.0	L	L	L	L	L	L	L	L	0.106	0.113	0.004
298.0	L	L	L	L	L	L	L	L	0.199	0.208	0.006
307.8	L	L	L	L	L	L	L	L	0.108	0.115	0.050
311.8	L	L	L	L	L	L	L	L	0.107	0.112	0.051
314.0	L	L	L	L	L	L	L	L	0.106	0.111	0.055

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUES WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

RSRM-1B Forward Center Segment Insulation Performance (Cont'd)

Table 24 (Cont'd)

RSRM 1-B Forward Segment Star Tip

STATION (IN)	COMPLIANCE SAFETY FACTOR (CSF) DEGREE LOCATION 90.0	154.0	222.0	286.0	352.0	MINIMUM	PLANE	REQUIRED SAFETY FACTOR	STATION (IN)	ACTUAL SAFETY FACTOR (ASF) DEGREE LOCATION 90.0	154.0	222.0	286.0	352.0	MINIMUM	PLANE
3.5	60.57	18.43	27.89	28.65	42.40	18.43	154.0	2.0	3.5	70.60	22.82	32.62	34.12	47.44	22.82	154.0
13.0	59.09	+	59.09	81.25	+	59.09	90.0	1.5	13.0	64.64	+	66.18	90.37	+	64.64	90.0
23.0	+	+	+	+	+			1.5	23.0	+	+	+	+	+		
27.0	+	+	+	+	+			1.5	27.0	+	+	+	+	+		
30.7	+	+	+	+	+			1.5	30.7	+	+	+	+	+		
34.2	+	+	+	+	+			1.5	34.2	+	+	+	+	+		
37.7	+	+	+	+	+			1.5	37.7	+	+	+	+	+		
41.2	+	+	+	+	+			1.5	41.2	+	+	+	+	+		
44.0	+	+	+	+	+			1.5	44.0	+	+	+	+	+		
94.7	+	+	+	+	+			1.5	94.7	+	+	+	+	+		
142.0	+	+	+	+	+			1.5	142.0	+	+	+	+	+		
145.7	9.36	+	+	10.17	13.00	9.36	90.0	1.5	145.7	10.56	+	+	11.70	15.17	10.56	90.0
148.5	4.76	39.43	34.50	14.53	12.55	4.76	90.0	1.5	148.5	5.29	39.71	35.88	15.53	13.05	5.29	90.0
152.0	10.57	8.81	10.57	63.40	35.22	8.81	154.0	1.5	152.0	11.73	9.69	11.70	67.00	36.78	9.69	154.0
155.0	+	+	+	8.57	4.14	4.14	352.0	1.5	155.0	+	+	+	12.79	6.14	6.14	352.0
162.0	8.13	16.26	3.04	7.00	15.75	3.04	222.0	2.0	162.0	12.00	22.94	4.64	10.33	23.13	4.64	222.0
171.0	1.60	1.41<	1.18<	1.55	1.03<	1.03	352.0	1.5	171.0	2.78	2.46	2.24	2.62	2.15	2.15	352.0
175.5	3.57	2.31	3.75	3.87	3.45	2.31	154.0	1.5	175.5	4.23	2.64	4.27	4.42	4.08	2.64	154.0
187.0	2.42	2.77	4.35	3.62	2.96	2.42	90.0	1.5	187.0	2.50	2.81	4.40	3.64	3.06	2.50	90.0
199.0	3.15	3.06	2.95	2.65	2.96	2.65	286.0	1.5	199.0	3.22	3.16	3.13	2.81	3.16	2.81	286.0
215.0	5.33	2.99	3.35	2.99	2.90	2.90	352.0	1.5	215.0	5.67	3.13	3.42	3.20	2.95	2.95	352.0
224.0	3.72	2.70	3.80	2.96	3.47	2.70	154.0	1.5	224.0	3.90	2.79	4.11	3 26	3.69	2.79	154.0
230.0	3.37	4.01	3.08	3.73	3.57	3.08	222.0	1.5	230.0	3.47	4.01	3.18	.85	3.69	3.18	222.0
236.0	3.75	3.23	3.57	2.71	2.58	2.58	352.0	1.5	236.0	3.88	3.23	3.66	2.78	2.68	2.68	352.0
240.0	3.17	5.74	2.44	2.73	2.71	2.44	222.0	1.5	240.0	3.27	5.83	2.54	2.91	2.80	2.54	222.0
251.0	2.44	2.45	2.56	4.18	2.52	2.44	90.0	1.5	251.0	2.86	3.11	3.04	4.28	3.31	2.86	90.0
263.0	2.83	5.80	2.81	3.42	3.02	2.81	222.0	1.5	263.0	2.85	5.88	2.89	3.50	3.03	2.85	90.0
280.0	2.56	2.18	3.16	3.79	4.40	2.18	154.0	1.5	280.0	3.35	2.75	4.08	4.07	4.47	2.75	154.0
293.0	3.00	3.14	2.44	2.90	2.45	2.44	222.0	1.5	293.0	3.26	3.85	3.23	3.32	2.96	2.96	352.0
305.0	2.56	3.13	2.79	2.87	2.93	2.56	90.0	1.5	305.0	2.59	3.14	2.91	2.96	3.04	2.59	90.0
312.0	2.62	2.89	3.66	2.77	2.67	2.62	90.0	1.5	312.0	2.83	3.24	3.84	3.03	2.92	2.83	90.0
321.0	2.59	3.24	4.03	3.67	3.24	2.59	90.0	2.0	321.0	2.61	3.44	4.22	3.77	3.63	2.61	90.0
330.0	2.47	2.30	2.12	2.38	2.62	2.12	222.0	1.5	330.0	4.27	4.13	3.84	4.16	4.66	3.84	222.0
347.0	4.63	2.39	2.29	1.28<	2.83	1.28	286.0	1.5	347.0	4.78	2.79	2.60	1.85	3.11	1.85	286.0
359.0	2.27	4.16	2.95	4.60	2.03	2.03	352.0	1.5	359.0	2.51	4.57	3.26	5.33	2.32	2.32	352.0
371.0	2.44	3.80	2.64	2.94	3.80	2.44	90.0	1.5	371.0	2.63	3.93	2.92	3.18	4.07	2.63	90.0
383.0	3.10	3.30	2.65	3.84	1.63	1.63	352.0	1.5	383.0	3.27	3.58	2.83	4.14	2.19	2.19	352.0
394.0	1.61	3.09	2.30	2.17	1.60	1.60	352.0	1.5	394.0	2.15	3.52	2.66	2.88	2.14	2.14	352.0

SEGMENT MINIMUM = 1.03 AT THE 171.0 INCH STATION

SEGMENT MINIMUM = 1.85 AT THE 347.0 INCH STATION.

A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

Table 25. RSRM-1B Forward Segment Star Tip Insulation Performance

RSRM 1-B Forward Segment Star Tip

STATION (IN)	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES — DEGREE LOCATION 90.0	154.0	222.0	286.0	352.0	MAXIMUM	AVE.	MEDIAN	STANDARD DEVIATION	STATION (IN)	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND — DEGREE LOCATION 90.0	154.0	222.0	286.0	352.0	AVERAGE	EXPOSURE TIME
3.5	0.035	0.115<	0.076	0.074	0.050	0.115	0.070	0.074	0.030	3.5	1.0	3.3	2.2	2.2	1.5	2.0	34.4
13.0	0.011	0	0.011	0.008	0	0.011	0.006	0.008	0.006	13.0	0.5	0	0.5	0.4	0	0.3	22.2
23.0	0	0	0	0	0					23.0	0	0	0	0	0		8.0
27.0	0	0	0	0	0					27.0	0	0	0	0	0		4.8
30.7	0	0	0	0	0					30.7	0	0	0	0	0		4.8
34.2	0	0	0	0	0					34.2	0	0	0	0	0		4.2
37.7	0	0	0	0	0					37.7	0	0	0	0	0		3.6
41.2	0	0	0	0	0					41.2	0	0	0	0	0		3.6
44.0	0	0	0	0	0					44.0	0	0	0	0	0		3.0
94.7	0	0	0	0	0					94.7	0	0	0	0	0		0.8
142.0	0	0	0	0	0					142.0	0	0	0	0	0		1.0
145.7	0.025	0	0	0.023	0.018	0.025	0.013	0.018	0.012	145.7	1.8	0	0	1.7	1.3	1.0	13.8
148.5	0.058	0.007	0.008	0.019	0.022	0.058	0.023	0.019	0.021	148.5	2.6	0.3	0.4	0.8	1.0	1.0	22.4
152.0	0.030	0.036	0.030	0.005	0.009	0.036	0.022	0.030	0.014	152.0	0.9	1.1	0.9	0.2	0.3	0.7	32.6
155.0	0	0	0	0.042	0.087	0.087	0.026	0.000	0.039	155.0	0	0	0	1.0	2.1	0.6	40.6
162.0	0.062	0.031	0.166	0.072	0.032	0.166	0.073	0.062	0.055	162.0	1.1	0.5	2.9	1.2	0.6	1.3	58.0
171.0	0.341<	0.387<	0.464<	0.353<	0.528<	0.528	0.415	0.387	0.079	171.0	4.3	4.8	5.8	4.4	6.6	5.2	79.8
175.5	0.169	0.261	0.161	0.156	0.175	0.261	0.184	0.169	0.043	175.5	1.9	2.9	1.8	1.7	2.0	2.1	89.2
187.0	0.265	0.231	0.147	0.177	0.216	0.265	0.207	0.216	0.046	187.0	2.6	2.3	1.4	1.7	2.1	2.0	102.0
199.0	0.204	0.210	0.218	0.243	0.217	0.243	0.218	0.217	0.015	199.0	2.0	2.1	2.1	2.4	2.1	2.1	102.0
215.0	0.120	0.214	0.191	0.214	0.220	0.220	0.192	0.214	0.042	215.0	1.2	2.1	1.9	2.1	2.2	1.9	102.0
224.0	0.172	0.237	0.168	0.216	0.184	0.237	0.195	0.184	0.030	224.0	1.7	2.3	1.6	2.1	1.8	1.9	102.0
230.0	0.174	0.146	0.190	0.157	0.164	0.190	0.166	0.164	0.017	230.0	1.7	1.4	1.9	1.5	1.6	1.6	102.0
236.0	0.154	0.179	0.162	0.213	0.224	0.224	0.186	0.179	0.031	236.0	1.5	1.8	1.6	2.1	2.2	1.8	102.0
240.0	0.181	0.100	0.235	0.210	0.212	0.235	0.188	0.210	0.053	240.0	1.8	1.0	2.3	2.1	2.1	1.8	102.0
251.0	0.233	0.232	0.222	0.136	0.225	0.233	0.210	0.225	0.041	251.0	2.3	2.3	2.2	1.3	2.2	2.1	102.0
263.0	0.201	0.098	0.202	0.166	0.188	0.202	0.171	0.188	0.043	263.0	2.0	1.0	2.0	1.6	1.8	1.7	102.0
280.0	0.222	0.260	0.180	0.150	0.129	0.260	0.188	0.180	0.053	280.0	2.2	2.5	1.8	1.5	1.3	1.8	102.0
293.0	0.182	0.174	0.224	0.188	0.223	0.224	0.198	0.188	0.024	293.0	1.8	1.7	2.2	1.8	2.2	1.9	102.0
305.0	0.205	0.168	0.188	0.183	0.179	0.205	0.185	0.183	0.014	305.0	2.0	1.6	1.8	1.8	1.8	1.8	102.0
312.0	0.200	0.181	0.143	0.189	0.196	0.200	0.182	0.189	0.023	312.0	2.0	1.8	1.4	1.9	1.9	1.8	102.0
321.0	0.354	0.283	0.228	0.250	0.283	0.354	0.280	0.283	0.048	321.0	3.4	2.7	2.2	2.4	2.7	2.7	104.2
330.0	0.223	0.240	0.260	0.232	0.210	0.260	0.233	0.232	0.019	330.0	2.2	2.4	2.6	2.3	2.1	2.3	101.6
347.0	0.113	0.219	0.228	0.409<	0.185	0.409	0.231	0.219	0.109	347.0	1.1	2.2	2.3	4.1	1.9	2.3	100.0
359.0	0.229	0.125	0.176	0.113	0.256	0.256	0.180	0.176	0.063	359.0	2.3	1.3	1.8	1.1	2.6	1.8	99.6
371.0	0.213	0.137	0.197	0.177	0.137	0.213	0.172	0.177	0.035	371.0	2.2	1.4	2.1	1.9	1.4	1.8	94.8
383.0	0.165	0.155	0.193	0.133	0.314<	0.314	0.192	0.165	0.072	383.0	1.7	1.6	2.0	1.4	3.3	2.0	96.2
394.0	0.312<	0.163	0.219	0.232	0.315<	0.315	0.248	0.232	0.065	394.0	3.2	1.7	2.2	2.4	3.2	2.5	97.8

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

Table 25. RSRM-1B Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-B Forward Segment Star Tip
PREFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD	
(IN)	90.0	154.0	222.0	286.0	352.0	MINIMUM	MEDIAN	DEVIATION	MDT
3.5	2.471	2.624	2.479	2.525	2.372	2.372	2.479	0.092	2.120
13.0	0.711	0.725	0.728	0.723	0.696	0.696	0.723	0.013	0.650
23.0	0.626	0.620	0.651	0.668	0.678	0.620	0.651	0.025	0.500
27.0	0.456	0.453	0.454	0.468	0.500	0.453	0.456	0.020	0.450
30.7	0.453	0.451	0.452	0.457	0.454	0.451	0.453	0.002	0.400
34.2	0.401	0.413	0.403	0.407	0.408	0.401	0.407	0.005	0.380
37.7	0.402	0.422	0.425	0.427	0.413	0.402	0.422	0.010	0.330
41.2	0.292	0.281	0.281	0.281	0.284	0.281	0.281	0.005	0.280
44.0	0.293	0.287	0.282	0.282	0.283	0.282	0.283	0.005	0.250
94.7	0.108	0.109	0.101	0.105	0.099	0.099	0.105	0.004	0.090
142.0	0.156	0.161	0.153	0.158	0.154	0.153	0.156	0.003	0.113
145.7	0.264	0.265	0.266	0.269	0.273	0.264	0.266	0.004	0.234
148.5	0.307	0.278	0.287	0.295	0.287	0.278	0.287	0.011	0.276
152.0	0.352	0.349	0.351	0.335	0.331	0.331	0.349	0.010	0.317
155.0	0.499	0.491	0.551	0.537	0.534	0.491	0.534	0.026	0.360
162.0	0.744	0.711	0.770	0.744	0.740	0.711	0.744	0.021	0.504
171.0	0.947	0.953	1.041	0.925	1.137	0.925	0.953	0.088	0.546
175.5	0.715	0.688	0.688	0.690	0.714	0.688	0.690	0.014	0.604
187.0	0.662	0.650	0.647	0.645	0.661	0.645	0.650	0.008	0.640
199.0	0.656	0.663	0.682	0.684	0.686	0.656	0.682	0.014	0.643
215.0	0.680	0.669	0.653	0.685	0.649	0.649	0.669	0.016	0.639
224.0	0.670	0.661	0.691	0.705	0.679	0.661	0.679	0.017	0.639
230.0	0.604	0.586	0.604	0.604	0.605	0.586	0.604	0.008	0.586
236.0	0.598	0.579	0.593	0.593	0.601	0.579	0.593	0.008	0.578
240.0	0.592	0.583	0.596	0.611	0.593	0.583	0.593	0.010	0.574
251.0	0.667	0.721	0.674	0.582	0.744	0.582	0.674	0.062	0.568
263.0	0.573	0.576	0.583	0.581	0.570	0.570	0.576	0.005	0.568
280.0	0.743	0.714	0.735	0.611	0.577	0.577	0.714	0.077	0.568
293.0	0.593	0.670	0.724	0.625	0.661	0.593	0.661	0.049	0.546
305.0	0.530	0.527	0.548	0.541	0.544	0.527	0.541	0.009	0.525
312.0	0.566	0.586	0.549	0.572	0.573	0.549	0.572	0.013	0.523
321.0	0.924	0.973	0.963	0.942	1.028	0.924	0.963	0.040	0.918
330.0	0.952	0.991	0.998	0.965	0.978	0.952	0.978	0.019	0.551
347.0	0.540	0.611	0.593	0.758	0.576	0.540	0.593	0.084	0.523
359.0	0.574	0.571	0.573	0.602	0.595	0.571	0.574	0.014	0.520
371.0	0.561	0.539	0.576	0.563	0.558	0.539	0.561	0.013	0.520
383.0	0.540	0.555	0.546	0.551	0.687	0.540	0.551	0.062	0.511
394.0	0.672	0.573	0.583	0.668	0.674	0.573	0.668	0.051	0.503

Table 25. RSRM-1B Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-B Forward Segment Star Tip
POSTFIRE MEASUREMENTS

STATION (IN)	DEGREE LOCATION 90.0	154.0	222.0	286.0	352.0	MINIMUM	MEDIAN	STANDARD DEVIATION
3.5	2.436	2.509	2.403	2.451	2.322	2.322	2.436	0.069
13.0	0.700	0.738	0.717	0.715	0.702	0.700	0.715	0.015
23.0	L	L	L	L	L	0.620	0.651	0.025
27.0	L	L	L	L	L	0.453	0.456	0.020
30.7	L	L	L	L	L	0.451	0.453	0.002
34.2	L	L	L	L	L	0.401	0.407	0.005
37.7	L	L	L	L	L	0.402	0.422	0.010
41.2	L	L	L	L	L	0.281	0.281	0.005
44.0	L	L	L	L	L	0.282	0.283	0.005
94.7	L	L	L	L	L	0.099	0.105	0.004
142.0	L	L	0.196	L	L	0.154	0.158	0.018
145.7	0.239	0.295	0.274	0.246	0.255	0.239	0.255	0.023
148.5	0.249	0.271	0.279	0.276	0.265	0.249	0.271	0.012
152.0	0.322	0.313	0.321	0.330	0.322	0.313	0.322	0.006
155.0	0.520	0.513	0.568	0.495	0.447	0.447	0.513	0.044
162.0	0.682	0.680	0.604	0.672	0.708	0.604	0.680	0.039
171.0	0.606	0.566	0.577	0.572	0.609	0.566	0.577	0.020
175.5	0.546	0.427	0.527	0.534	0.539	0.427	0.534	0.049
187.0	0.397	0.419	0.500	0.468	0.445	0.397	0.445	0.040
199.0	0.452	0.453	0.464	0.441	0.469	0.441	0.453	0.011
215.0	0.560	0.455	0.462	0.471	0.429	0.429	0.462	0.050
224.0	0.498	0.424	0.523	0.489	0.495	0.424	0.495	0.037
230.0	0.430	0.440	0.414	0.447	0.441	0.414	0.440	0.013
236.0	0.444	0.400	0.431	0.380	0.377	0.377	0.400	0.030
240.0	0.411	0.483	0.361	0.401	0.381	0.361	0.401	0.046
251.0	0.434	0.489	0.452	0.446	0.519	0.434	0.452	0.035
263.0	0.372	0.478	0.381	0.415	0.382	0.372	0.382	0.044
280.0	0.521	0.454	0.555	0.461	0.448	0.448	0.461	0.048
293.0	0.411	0.496	0.500	0.437	0.438	0.411	0.438	0.040
305.0	0.325	0.359	0.360	0.358	0.365	0.325	0.359	0.016
312.0	0.366	0.405	0.406	0.383	0.377	0.366	0.383	0.018
321.0	0.570	0.690	0.735	0.692	0.745	0.570	0.692	0.070
330.0	0.729	0.751	0.738	0.733	0.768	0.729	0.738	0.016
347.0	0.427	0.392	0.365	0.349	0.391	0.349	0.391	0.030
359.0	0.345	0.446	0.397	0.489	0.339	0.339	0.397	0.065
371.0	0.348	0.402	0.379	0.386	0.421	0.348	0.386	0.027
383.0	0.375	0.400	0.353	0.418	0.373	0.353	0.375	0.025
394.0	0.360	0.410	0.364	0.436	0.359	0.359	0.364	0.035

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUE WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

Table 25. RSRM-1B Forward Segment Star Tip Insulation Performance (Cont'd)

RSRM 1-B Forward Segment Non-Star Tip

COMPLIANCE SAFETY FACTOR (CSF)									ACTUAL SAFETY FACTOR (ASF)							
STATION	DEGREE LOCATION							REQUIRED	STATION	DEGREE LOCATION						
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	PLANE	SAFETY FACTOR	(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	PLANE
3.5	3.86	13.25	30.72	16.43	6.79	3.86	74.0	2.0	3.5	5.30	15.59	36.70	19.47	8.06	5.30	74.0
13.0	24.07	2.80	+	9.03	9.03	2.80	140.0	1.5	13.0	26.33	3.99	+	10.56	10.33	3.99	140.0
23.0	+	+	+	+	+			1.5	23.0	+	+	+	+	+		
27.0	+	+	+	+	+			1.5	27.0	+	+	+	+	+		
30.7	+	+	+	+	+			1.5	30.7	+	+	+	+	+		
34.2	+	+	+	+	+			1.5	34.2	+	+	+	+	+		
37.7	+	+	+	+	+			1.5	37.7	+	+	+	+	+		
41.2	+	+	+	+	+			1.5	41.2	+	+	+	+	+		
44.0	+	+	+	+	+			1.5	44.0	+	+	+	+	+		
94.7	+	+	+	+	+			1.5	94.7	+	+	+	+	+		
142.0	+	+	+	+	+			1.5	142.0	+	+	+	+	+		
145.7	+	+	+	+	+			1.5	145.7	+	+	+	+	+		
148.5	92.00	12.55	+	+	+	12.55	140.0	1.5	148.5	97.67	13.23	+	+	+	13.23	140.0
152.0	12.19	18.65	13.78	31.70	17.61	12.19	74.0	1.5	152.0	13.50	20.35	15.26	35.40	18.61	13.50	74.0
155.0	6.43	8.00	+	6.79	18.00	6.43	74.0	1.5	155.0	8.77	10.56	+	11.34	27.65	8.77	74.0
162.0	13.62	7.52	13.62	16.26	5.66	5.66	336.0	2.0	162.0	19.43	10.73	19.76	24.06	8.24	8.24	336.0
171.0	4.92	1.66	1.49<	1.88	1.58	1.49	206.0	1.5	171.0	6.53	2.86	2.74	3.30	2.73	2.73	336.0
175.5	7.11	4.58	5.75	4.17	4.38	4.17	270.0	1.5	175.5	8.27	4.92	6.59	5.01	5.01	4.92	140.0
187.0	5.12	4.13	6.04	3.74	4.78	3.74	270.0	1.5	187.0	5.13	4.24	6.19	4.15	5.03	4.15	270.0
199.0	5.79	6.12	6.91	6.43	4.69	4.69	336.0	1.5	199.0	5.99	6.22	7.14	6.77	4.96	4.96	336.0
215.0	3.35	3.44	8.30	5.20	4.73	3.35	74.0	1.5	215.0	4.03	3.74	8.68	5.45	5.12	3.74	140.0
224.0	4.60	4.88	5.65	4.88	4.15	4.15	336.0	1.5	224.0	4.95	4.98	5.95	5.24	4.51	4.51	336.0
230.0	5.53	5.43	17.24	4.54	4.37	4.37	336.0	1.5	230.0	5.58	5.51	17.38	4.83	4.63	4.63	336.0
236.0	15.62	5.07	11.12	4.74	3.73	3.73	336.0	1.5	236.0	15.62	5.08	11.35	5.09	4.06	4.06	336.0
240.0	10.07	5.17	6.04	5.08	3.61	3.61	336.0	1.5	240.0	10.54	5.27	6.21	5.48	3.99	3.99	336.0
251.0	5.74	3.21	3.94	18.32	3.76	3.21	140.0	1.5	251.0	6.46	4.04	5.53	19.61	4.70	4.04	140.0
263.0	5.03	4.37	7.10	4.73	4.66	4.37	140.0	1.5	263.0	5.09	4.43	7.21	4.96	4.79	4.43	140.0
280.0	5.21	6.04	7.38	4.98	4.81	4.81	336.0	1.5	280.0	6.68	7.45	9.82	6.33	5.68	5.68	336.0
293.0	2.28	3.39	5.15	3.59	5.46	2.28	74.0	1.5	293.0	2.86	4.27	6.36	4.55	6.80	2.86	74.0
305.0	3.92	4.17	1.97	6.03	6.33	1.97	206.0	1.5	305.0	3.96	4.19	2.62	6.25	6.46	2.62	206.0
312.0	5.08	3.71	4.32	3.82	4.47	3.71	140.0	1.5	312.0	5.37	4.26	5.09	4.45	4.87	4.26	140.0
321.0	5.81	4.17	14.34	6.56	6.56	4.17	140.0	2.0	321.0	5.90	4.29	14.39	6.61	6.59	4.29	140.0
330.0	2.73	3.72	3.24	3.65	3.01	2.73	74.0	1.5	330.0	5.13	6.70	5.86	6.46	5.72	5.13	74.0
347.0	3.21	2.92	3.58	1.41<	1.35<	1.35	336.0	1.5	347.0	3.75	3.39	4.28	2.17	2.05	2.05	336.0
359.0	1.82	3.51	3.29	3.66	3.49	1.82	74.0	1.5	359.0	2.50	3.72	4.94	4.38	3.77	2.50	74.0
371.0	2.63	3.61	4.16	3.19	1.79	1.79	336.0	1.5	371.0	2.88	3.63	4.65	3.53	2.33	2.33	336.0
383.0	3.10	4.37	2.70	3.52	3.43	2.70	206.0	1.5	383.0	3.27	4.52	2.94	3.83	3.72	2.94	206.0
394.0	3.54	2.29	3.45	2.01	1.93	1.93	336.0	1.5	394.0	3.89	2.65	3.99	2.54	2.40	2.40	336.0

SEGMENT MINIMUM = 1.35 AT THE 347.0 INCH STATION

SEGMENT MINIMUM = 2.05 AT THE 347.0 INCH STATION.

A " < " INDICATES THE PRECEDING SAFETY FACTOR HAS VIOLATED THE MINIMUM SAFETY FACTOR REQUIREMENT.

A " + " MEANS NEGLIGIBLE MDD HAS OCCURRED.

Table 26 RSRM-1B Forward Segment Non-Star Tip Insulation Performance

RSRM 1-B Forward Segment Non-Star Tip

STATION	MATERIAL DECOMPOSITION DEPTH (MDD) INCHES									STATION	MATERIAL DECOMPOSITION RATE (MDR) MILS / SECOND						
	DEGREE LOCATION								STANDARD		DEGREE LOCATION						EXPOSURE
(IN)	74.0	140.0	206.0	270.0	336.0	MAXIMUM	AVE.	MEDIAN	DEVIATION	(IN)	74.0	140.0	206.0	270.0	336.0	AVERAGE	TIME
3.5	0.549<	0.160<	0.069	0.129<	0.312<	0.549	0.244	0.160	0.193	3.5	16.0	4.7	2.0	3.7	9.1	7.1	34.4
13.0	0.027	0.232<	0	0.072	0.072	0.232	0.081	0.072	0.090	13.0	1.2	10.5	0	3.2	3.2	3.6	22.2
23.0	0	0	0	0	0					23.0	0	0	0	0	0		8.0
27.0	0	0	0	0	0					27.0	0	0	0	0	0		4.8
30.7	0	0	0	0	0					30.7	0	0	0	0	0		4.8
34.2	0	0	0	0	0					34.2	0	0	0	0	0		4.2
37.7	0	0	0	0	0					37.7	0	0	0	0	0		3.6
41.2	0	0	0	0	0					41.2	0	0	0	0	0		3.6
44.0	0	0	0	0	0					44.0	0	0	0	0	0		3.0
94.7	0	0	0	0	0					94.7	0	0	0	0	0		0.8
142.0	0	0	0	0	0					142.0	0	0	0	0	0		1.0
145.7	0	0	0	0	0					145.7	0	0	0	0	0		2.0
148.5	0.003	0.022	0	0	0	0.022	0.005	0.000	0.010	148.5	0.3	2.0	0	0	0	0.5	10.8
152.0	0.026	0.017	0.023	0.010	0.018	0.026	0.019	0.018	0.006	152.0	1.3	0.8	1.1	0.5	0.9	0.9	20.8
155.0	0.056	0.045	0	0.053	0.020	0.056	0.035	0.045	0.024	155.0	2.0	1.6	0	1.9	0.7	1.2	28.4
162.0	0.037	0.067	0.037	0.031	0.089	0.089	0.052	0.037	0.025	162.0	0.8	1.5	0.8	0.7	2.0	1.2	44.4
171.0	0.111	0.328	0.366<	0.290	0.346<	0.366	0.288	0.328	0.103	171.0	1.8	5.3	5.9	4.7	5.6	4.7	61.6
175.5	0.085	0.132	0.105	0.145	0.138	0.145	0.121	0.132	0.025	175.5	1.2	1.9	1.5	2.1	2.0	1.8	68.4
187.0	0.125	0.155	0.106	0.171	0.134	0.171	0.138	0.134	0.025	187.0	1.9	2.3	1.6	2.6	2.0	2.1	66.6
199.0	0.111	0.105	0.093	0.100	0.137	0.137	0.109	0.105	0.017	199.0	1.7	1.6	1.4	1.5	2.1	1.6	66.6
215.0	0.191	0.186	0.077	0.123	0.135	0.191	0.142	0.135	0.047	215.0	2.9	2.8	1.2	1.8	2.0	2.1	66.6
224.0	0.139	0.131	0.113	0.131	0.154	0.154	0.134	0.131	0.015	224.0	2.1	2.0	1.7	2.0	2.3	2.0	66.6
230.0	0.106	0.108	0.034	0.129	0.134	0.134	0.102	0.108	0.040	230.0	1.6	1.6	0.5	1.9	2.0	1.5	66.6
236.0	0.037	0.114	0.052	0.122	0.155	0.155	0.096	0.114	0.050	236.0	0.6	1.7	0.8	1.8	2.3	1.4	66.6
240.0	0.057	0.111	0.095	0.113	0.159	0.159	0.107	0.111	0.037	240.0	0.9	1.7	1.4	1.7	2.4	1.6	66.6
251.0	0.099	0.177	0.144	0.031	0.151	0.177	0.120	0.144	0.057	251.0	1.5	2.7	2.2	0.5	2.3	1.8	66.6
263.0	0.113	0.130	0.080	0.120	0.122	0.130	0.113	0.120	0.019	263.0	1.7	2.0	1.2	1.8	1.8	1.7	66.6
280.0	0.109	0.094	0.077	0.114	0.118	0.118	0.102	0.109	0.017	280.0	1.6	1.4	1.2	1.7	1.8	1.5	66.6
293.0	0.240	0.161	0.106	0.152	0.100	0.240	0.152	0.152	0.056	293.0	3.6	2.4	1.6	2.3	1.5	2.3	66.6
305.0	0.134	0.126	0.267	0.087	0.083	0.267	0.139	0.126	0.075	305.0	2.0	1.9	4.0	1.3	1.2	2.1	66.6
312.0	0.103	0.141	0.121	0.137	0.117	0.141	0.124	0.121	0.015	312.0	1.5	2.1	1.8	2.1	1.8	1.9	66.6
321.0	0.158	0.220	0.064	0.140	0.140	0.220	0.144	0.140	0.056	321.0	2.1	3.0	0.9	1.9	1.9	2.0	74.0
330.0	0.202	0.148	0.170	0.151	0.183	0.202	0.171	0.170	0.023	330.0	2.8	2.0	2.3	2.1	2.5	2.3	73.0
347.0	0.163	0.179	0.146	0.371<	0.388<	0.388	0.249	0.179	0.119	347.0	2.3	2.5	2.0	5.1	5.4	3.4	72.4
359.0	0.286<	0.148	0.158	0.142	0.149	0.286	0.177	0.149	0.061	359.0	4.0	2.0	2.2	2.0	2.1	2.4	72.2
371.0	0.198	0.144	0.125	0.163	0.290	0.290	0.184	0.163	0.065	371.0	2.8	2.1	1.8	2.3	4.1	2.6	70.0
383.0	0.165	0.117	0.189	0.145	0.149	0.189	0.153	0.149	0.027	383.0	2.3	1.7	2.7	2.0	2.1	2.2	70.8
394.0	0.142	0.220	0.146	0.250	0.261	0.261	0.204	0.220	0.057	394.0	2.0	3.1	2.0	3.5	3.7	2.9	71.4

A " < " INDICATES THE PRECEDING MDD HAS EXCEEDED THE M + 3 SIGMA DESIGN CRITERIA.

Table 26 RSRM-1B Forward Segment Non-Star Tip Insulation Performance (Cont'd)

RSRM 1-B Forward Segment Non-Star Tip
PREFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD	
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	MEDIAN	DEVIATION	MDT
3.5	2.909	2.495	2.532	2.511	2.514	2.495	2.514	0.178	2.120
13.0	0.711	0.925	0.712	0.760	0.744	0.711	0.744	0.089	0.650
23.0	0.645	0.622	0.658	0.659	0.671	0.622	0.658	0.019	0.500
27.0	0.477	0.454	0.453	0.456	0.458	0.453	0.456	0.010	0.450
30.7	0.445	0.452	0.451	0.451	0.453	0.445	0.451	0.003	0.400
34.2	0.390	0.405	0.422	0.401	0.425	0.390	0.405	0.015	0.380
37.7	0.388	0.425	0.421	0.420	0.427	0.388	0.421	0.016	0.330
41.2	0.280	0.280	0.280	0.280	0.283	0.280	0.280	0.001	0.280
44.0	0.283	0.282	0.279	0.296	0.286	0.279	0.283	0.007	0.250
94.7	0.112	0.109	0.101	0.105	0.098	0.098	0.105	0.006	0.090
142.0	0.156	0.154	0.156	0.158	0.157	0.154	0.156	0.001	0.113
145.7	0.270	0.277	0.265	0.276	0.280	0.265	0.276	0.006	0.234
148.5	0.293	0.291	0.303	0.310	0.327	0.291	0.303	0.015	0.276
152.0	0.351	0.346	0.351	0.354	0.335	0.335	0.351	0.008	0.317
155.0	0.491	0.475	0.537	0.601	0.553	0.475	0.537	0.050	0.360
162.0	0.719	0.719	0.731	0.746	0.733	0.719	0.731	0.011	0.504
171.0	0.725	0.938	1.003	0.956	0.944	0.725	0.944	0.108	0.546
175.5	0.703	0.650	0.692	0.727	0.692	0.650	0.692	0.028	0.604
187.0	0.641	0.657	0.656	0.710	0.674	0.641	0.657	0.026	0.640
199.0	0.665	0.653	0.664	0.677	0.680	0.653	0.665	0.011	0.643
215.0	0.770	0.695	0.668	0.670	0.691	0.668	0.691	0.042	0.639
224.0	0.688	0.653	0.672	0.687	0.695	0.653	0.687	0.017	0.639
230.0	0.591	0.595	0.591	0.623	0.620	0.591	0.595	0.016	0.586
236.0	0.578	0.579	0.590	0.621	0.630	0.578	0.590	0.024	0.578
240.0	0.601	0.585	0.590	0.619	0.635	0.585	0.601	0.021	0.574
251.0	0.640	0.715	0.796	0.608	0.710	0.608	0.710	0.073	0.568
263.0	0.575	0.576	0.577	0.595	0.584	0.575	0.577	0.008	0.568
280.0	0.728	0.700	0.756	0.722	0.670	0.670	0.722	0.032	0.568
293.0	0.686	0.688	0.674	0.692	0.680	0.674	0.686	0.007	0.546
305.0	0.531	0.528	0.699	0.544	0.536	0.528	0.536	0.074	0.525
312.0	0.553	0.600	0.616	0.610	0.570	0.553	0.600	0.027	0.523
321.0	0.932	0.944	0.921	0.925	0.923	0.921	0.925	0.009	0.918
330.0	1.037	0.992	0.997	0.976	1.047	0.976	0.997	0.031	0.551
347.0	0.611	0.606	0.625	0.805	0.796	0.606	0.625	0.102	0.523
359.0	0.715	0.550	0.781	0.622	0.561	0.550	0.622	0.100	0.520
371.0	0.570	0.522	0.581	0.575	0.676	0.522	0.575	0.056	0.520
383.0	0.539	0.529	0.555	0.556	0.554	0.529	0.554	0.012	0.511
394.0	0.552	0.583	0.583	0.634	0.627	0.552	0.583	0.034	0.503

Table 26. RSRM-1B Forward Segment Non-Star Tip Insulation Performance (Cont'd)

RSRM 1-B Forward Segment Non-Star Tip

POSTFIRE MEASUREMENTS

STATION	DEGREE LOCATION							STANDARD
(IN)	74.0	140.0	206.0	270.0	336.0	MINIMUM	MEDIAN	DEVIATION
3.5	2.360	2.335	2.463	2.382	2.202	2.202	2.360	0.095
13.0	0.684	0.693	0.780	0.688	0.672	0.672	0.688	0.044
23.0	L	L	L	L	L	0.622	0.658	0.019
27.0	L	L	L	L	L	0.453	0.456	0.010
30.7	L	L	L	L	L	0.445	0.451	0.003
34.2	L	L	L	L	L	0.390	0.405	0.015
37.7	L	L	L	L	L	0.388	0.421	0.016
41.2	L	L	L	L	L	0.280	0.280	0.001
44.0	L	L	L	L	L	0.279	0.283	0.007
94.7	L	L	L	L	L	0.098	0.105	0.006
142.0	L	L	L	L	L	0.154	0.156	0.001
145.7	L	L	L	L	L	0.265	0.276	0.006
148.5	0.290	0.269	0.328	L	L	0.269	0.310	0.025
152.0	0.325	0.329	0.328	0.344	0.317	0.317	0.328	0.010
155.0	0.435	0.430	0.538	0.548	0.533	0.430	0.533	0.059
162.0	0.682	0.652	0.694	0.715	0.644	0.644	0.682	0.029
171.0	0.614	0.610	0.637	0.666	0.598	0.598	0.614	0.027
175.5	0.618	0.518	0.587	0.582	0.554	0.518	0.582	0.038
187.0	0.516	0.502	0.550	0.539	0.540	0.502	0.539	0.020
199.0	0.554	0.548	0.571	0.577	0.543	0.543	0.554	0.015
215.0	0.579	0.509	0.591	0.547	0.556	0.509	0.556	0.032
224.0	0.549	0.522	0.559	0.556	0.541	0.522	0.549	0.015
230.0	0.485	0.487	0.557	0.494	0.486	0.485	0.487	0.031
236.0	0.541	0.465	0.538	0.499	0.475	0.465	0.499	0.035
240.0	0.544	0.474	0.495	0.506	0.476	0.474	0.495	0.028
251.0	0.541	0.538	0.652	0.577	0.559	0.538	0.559	0.047
263.0	0.462	0.446	0.497	0.475	0.462	0.446	0.462	0.019
280.0	0.619	0.606	0.679	0.608	0.552	0.552	0.608	0.045
293.0	0.446	0.527	0.568	0.540	0.580	0.446	0.540	0.053
305.0	0.397	0.402	0.432	0.457	0.453	0.397	0.432	0.028
312.0	0.450	0.459	0.495	0.473	0.453	0.450	0.459	0.018
321.0	0.774	0.724	0.857	0.785	0.783	0.724	0.783	0.048
330.0	0.835	0.844	0.827	0.825	0.864	0.825	0.835	0.016
347.0	0.448	0.427	0.479	0.434	0.408	0.408	0.434	0.027
359.0	0.429	0.402	0.623	0.480	0.412	0.402	0.429	0.091
371.0	0.372	0.378	0.456	0.412	0.386	0.372	0.386	0.034
383.0	0.374	0.412	0.366	0.411	0.405	0.366	0.405	0.022
394.0	0.410	0.363	0.437	0.384	0.366	0.363	0.384	0.031

AN " L " INDICATES THAT LINER MATERIAL WAS REMAINING AT THAT LOCATION.
THE MEDIAN AND MINIMUM VALUE WERE CALCULATED USING THE PREFIRE THICKNESSES
AT THE LOCATIONS WHERE LINER MATERIAL WAS REMAINING.

Table 26 RSRM-1B Forward Segment Non-Star Tip Insulation Performance (Cont'd)

Appendix A

RSRM-1A Insulation Evaluations

Table A-1
RSRM-1A Nozzle to Case Joint Insulation Evaluation

Motor No.: RSRM-1A	Date: 12 October 1988	Time: 0900 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1. Voids?	X	yes		no		1
2. Gas Paths?		yes	X	no		
3. Soot?		yes	X	no		
4. Foreign Material?		yes	X	no		
5. Porosity (Adhesive)?	X	yes		no		2
6. Aft Dome Edge Unbonds?		yes	X	no		3
7. Baffle intact?	X	yes		no		
8. Polysulfide in vent slots?	X	yes		no		4
9. Polysulfide failure mode	60	% adhesive w/ aft dome	40	% cohesive		

Comments:

1. Polysulfide voids

VOID	DEGREE	LONGITUDINAL LENGTH	CIRCUMFERENTIAL WIDTH	DISTANCE FROM STEP
1	336.6	0.25	0.19	1.63
2	239.4	0.50	0.22	0.09
3	232.4	0.41	0.16	0.09 UP RAMP
4	189.0	0.38	0.25	1.34

2. Small amount of porosity was evident in the step region.

3. This inspection was performed at Clearfield H-7. No unbonds were found.

4. Polysulfide vent slot fill

DEGREE LOCATION	% SLOT FILL	DEGREE LOCATION	% SLOT FILL	DEGREE LOCATION	% SLOT FILL
0°	60	122.4°	80	244.8°	100
7.2°	100	129.6°	100	252.0°	20
14.4°	100	136.8°	90	259.2°	20
21.6°	100	144.0°	100	266.4°	100
28.8°	70	151.2°	20	273.6°	20
36.0°	100	158.4°	80	280.8°	100
43.2°	100	165.6°	100	288.0°	30
50.4°	100	172.8°	40	295.2°	100
57.6°	100	180.0°	70	302.4°	30
64.8°	20	187.2°	100	309.6°	40
72.0°	100	194.4°	50	316.8°	100
79.2°	80	201.6°	100	324.0°	100
86.4°	50	208.8°	100	331.2°	100
93.6°	100	216.0°	100	338.4°	100
100.8°	100	223.2°	100	345.6°	60
108.0°	50	230.4°	100	352.8°	100
115.2°	90	237.6°	100		

Average = 80% Maximum = 100% Minimum = 20%

Table A-2
RSRM-1A Aft Field Joint Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1800 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
1. Areas of Non-Contact?	X	yes		no	5
2. Gas paths?		yes	X	no	
3. Soot?	X	yes		no	
4. Heat Affected Material (color)?					
A. Tang	X	yes		no	6
B. Clevis	X	yes		no	7
5. Foreign Material?		yes	X	no	
6. Crazing		yes	X	no	
7. Clevis edge unbonds	X	yes		no	8

Comments:

5. Minimal areas of non-contact evident inboard of the radius region for less than 5% of the circumference with contact outboard of this location through the radius region. Contact at J-leg tip evident full circumference.

6. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	3.17	2.90	2.36	2.16
90	3.18	2.86	2.20	2.10
180	3.10	2.87	2.30	2.00
270	2.91	NO CHAR	2.50	1.75

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

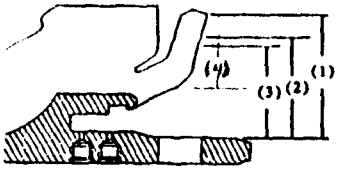
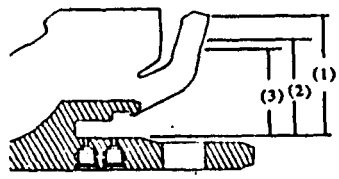


Table A-2 (Cont'd)
RSRM-1A Aft Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.825	2.768	180		2.806	2.663
10		2.848	2.715	190		2.783	2.662
20		2.872	2.725	200		2.760	2.560
30		2.799	2.690	210		2.771	2.680
40		2.880	2.698	220		2.780	2.688
50		2.836	2.700	230		2.880	2.677
60		2.830	2.660	242		2.779	2.630
70		2.815	2.670	250		2.762	2.632
80		2.886	2.710	260		2.830	2.680
90		2.850	2.765	270		2.761	2.672
100		2.788	2.662	280		2.768	2.664
110		2.788	2.630	290		2.771	2.688
120		2.804	2.675	300		2.781	2.685
130		2.788	2.658	310		2.740	2.640
140		2.795	2.648	320		2.765	2.628
150		2.768	2.610	330		2.818	2.660
160		2.789	2.650	340		2.804	2.672
170		2.830	2.670	350		2.788	2.636



* No char remained after rinse

7. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements were taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.780	2.374	180		2.748	2.478
10		2.765	2.475	190		2.710	2.402
20		2.721	2.437	200		2.700	2.451
30		2.741	2.458	210		2.748	2.411
40		2.744	2.472	220		2.748	2.532
50		2.716	2.459	230		2.723	2.454
60		2.664	2.407	242		2.725	2.453
70		2.708	2.460	250		2.721	2.502
80		2.747	2.456	260		2.738	2.380
90		2.720	2.438	270		2.824	2.440
100		2.705	2.446	280		2.762	2.535
110		2.741	2.473	290		2.887	2.533
120		2.719	2.475	300		2.804	2.523
130		2.749	2.434	310		2.751	2.494
140		2.728	2.474	320		2.734	2.438
150		2.758	2.452	330		2.813	2.557
160		2.743	2.620	340		2.813	2.429
170		2.755	2.475	350		2.820	2.432

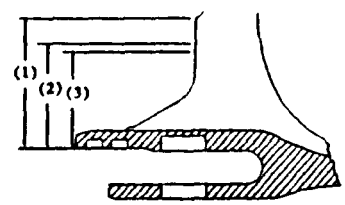


Table A-2 (Cont'd)
RSRM-1A Aft Field Joint Insulation Evaluation

8. KSC Preliminary Clevis Edge Separations

EDGE UNBOND	SEGMENT END	MAX. AXIAL DEPTH (IN)	*DEGREE LOCATION	CIRC. WIDTH (IN)	DEGREE ARC
1	CLEVIS	0.20	256°		256° - 258°

* Degree location of maximum axial depth measurement

Table A-3
RSRM-1A Aft Field Joint Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 0300 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
1. Areas of non-contact?	X	yes		no	9
2. Gas paths?		yes	X	no	
3. Soot?		yes	X	no	
4. Heat affected material (color)?					
A. Tang	X	yes		no	10
B. Clevis	X	yes		no	11
5. Foreign material?		yes	X	no	
6. Crazing?		yes	X	no	
7. Clevis edge unbonds?	X	yes		no	12

Comments:

9. Minimal areas of non-contact evident inboard of the radius region for the full circumference with contact outboard of this location through the radius region. Contact at J-leg tip evident full circumference.

10. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	3.25	3.10	2.96	1.85
90	3.15	NO CHAR	2.90	1.80
180	3.20	3.00	2.80	1.74
270	3.18	NO CHAR	2.80	1.80

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

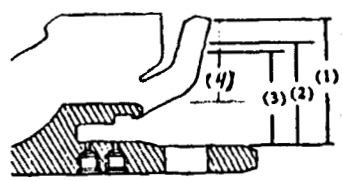
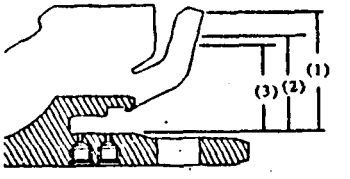


Table A-3 (Cont'd)
RSRM-1A Center Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		3.082	2.880	180		3.066	2.969
10		3.052	2.882	190		3.039	2.942
20		3.112	2.888	200		3.075	2.581
30		3.072	2.845	210		3.065	2.732
40		3.085	2.832	220		3.020	2.830
50		3.092	2.950	230		3.085	2.898
60		3.070	2.889	242		3.063	2.961
70		3.080	2.970	250		3.039	2.942
80		3.085	2.903	260		3.075	2.581
90		3.054	2.919	270		3.065	2.732
100		3.068	2.938	280		3.020	2.830
110		3.050	2.932	290		3.085	2.898
120		3.032	2.930	300		3.086	2.975
130		3.060	2.948	310		3.097	2.975
140		3.085	2.952	320		3.068	2.955
150		3.048	2.935	330		3.074	2.946
160		3.070	2.951	340		3.055	2.955
170		3.056	2.920	350		3.052	2.949

* No char remained after rinse.



11. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements were taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.910	2.872	180		2.932	2.736
10		2.920	2.862	190		2.972	2.855
20		2.960	2.805	200		2.945	2.798
30		2.931	2.685	210		2.962	2.728
40		2.935	2.776	220		2.958	2.742
50		2.914	2.724	230		2.964	2.751
60		2.923	2.772	242		2.929	2.775
70		2.910	2.735	250		2.952	2.735
80		2.868	2.770	260		2.950	2.780
90		2.945	2.805	270		2.930	2.731
100		2.943	2.812	280		2.938	2.705
110		2.895	2.790	290		2.921	2.768
120		2.875	2.806	300		2.940	2.780
130		2.925	2.785	310		2.925	2.772
140		2.940	2.885	320		2.934	2.778
150		2.910	2.840	330		2.926	2.740
160		2.945	2.870	340		2.916	2.778
170		2.935	2.810	350		2.917	2.741

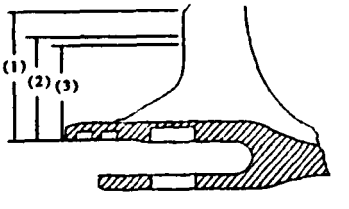


Table A-3 (Cont'd)
RSRM-1A Center Field Joint Insulation Evaluation

12. KSC Preliminary Clevis Edge Separations

EDGE UNBOND	SEGMENT END	MAX. AXIAL DEPTH (IN)	*DEGREE LOCATION	CIRC. WIDTH (IN)	DEGREE ARC
1	CLEVIS	0.10	8°	0.40	
2	CLEVIS	0.20	46°	1.00	46°-47°
3	CLEVIS	0.15	77°	0.25	
4	CLEVIS	0.13	82°	0.20	
5	CLEVIS	0.10	116°	0.15	
6	CLEVIS	0.10	202°	0.15	
7	CLEVIS	0.15	258°	0.20	
8	CLEVIS	0.10	266°	0.20	
9	CLEVIS	0.10	328°	0.40	

* DEGREE LOCATION OF MAXIMUM AXIAL DEPTH MEASUREMENT

Table A-4
RSRM-1A Forward Field Joint Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1800 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
1. Areas of non-contact?		yes	X	no	
2. Gas Paths?		yes	X	no	
3. Soot?	X	yes		no	13
4. Heat affected material (color)?					
A. Tang	X	yes		no	14
B. Clevis	X	yes		no	15
5. Foreign Material?		yes	X	no	
6. Craxing?		yes	X	no	
7. Clevis edge unbonds?	X	yes		no	16

Comments:

13. Soot deposits extending down the bondline into the start of the radius were identified at several locations around the circumference, Figure 5. These sooted regions frequently corresponded to large radial inhibitor tears or areas where a portion of the NBR inhibitor was torn away. The insulation underneath was not heat affected.

14. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	3.18	NO CHAR	2.80	1.20
90	3.20	NO CHAR	2.80	1.00
180	3.20	NO CHAR	2.80	1.00
270	3.20	NO CHAR	2.30	0.90

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

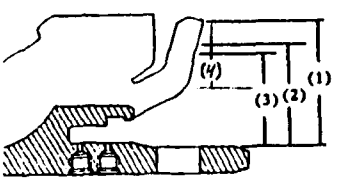
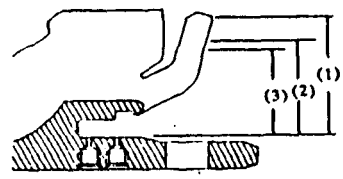


Table A-4 (Cont'd)
RSRM-1A Forward Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.986	2.678	180		2.970	2.774
10		2.943	2.737	190		2.967	2.813
20		3.021	2.814	200		2.973	2.790
30		2.998	2.802	210		2.880	2.755
40		3.001	2.822	220		2.992	2.803
50		3.022	2.806	230		2.973	2.767
60		3.015	2.838	242		2.980	2.770
70		3.041	2.860	250		2.974	2.801
80		2.991	2.837	260		2.994	2.775
90		3.033	2.823	270		2.985	2.745
100		3.069	2.843	280		2.980	2.741
110		2.992	2.788	290		2.984	2.750
120		2.846	2.702	300		2.982	2.756
130		3.032	2.795	310		2.995	2.775
140		3.035	2.840	320		2.998	2.840
150		3.011	2.849	330		2.980	2.730
160		2.991	2.804	340		2.970	2.771
170		2.985	2.811	350		2.981	2.685



* No char remained after rinse.

15. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements were taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.931	2.810	180		3.095	2.934
10		2.979	2.777	190		3.097	2.713
20		3.034	2.974	200		3.012	2.786
30		3.088	2.904	210		3.015	2.838
40		3.060	2.919	220		3.023	2.857
50		3.013	2.948	230		3.008	2.812
60		3.039	2.921	242		3.005	2.798
70		3.021	2.931	250		3.001	2.880
80		3.033	2.929	260		3.029	2.843
90		3.038	2.954	270		3.015	2.807
100		3.020	2.901	280		3.211	2.870
110		3.093	2.974	290		3.050	2.836
120		3.012	2.853	300		3.032	2.933
130		3.042	2.912	310		3.018	2.859
140		3.048	2.996	320		3.016	2.890
150		3.043	2.783	330		3.010	2.793
160		3.020	2.911	340		3.005	2.860
170		3.028	2.926	350		2.973	2.679

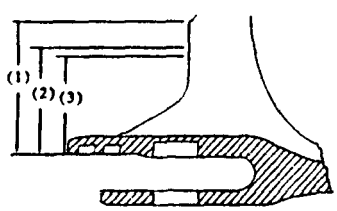


Table A-4 (Cont'd)
RSRM-1A Forward Field Joint Insulation Evaluation

16. KSC Preliminary Clevis Edge Separations

EDGE UNBOND	SEGMENT END	MAX. AXIAL DEPTH (IN)	*DEGREE LOCATION	CIRC. WIDTH (IN)	DEGREE ARC
1	CLEVIS	0.15	284°	0.30	
2	CLEVIS	0.15	182°	0.15	
3	CLEVIS	0.12	292°	0.20	
4	CLEVIS	0.10	166°	0.25	
5	CLEVIS	0.10	167°	0.70	
6	CLEVIS	0.19	76°	0.35	
7	CLEVIS	0.24	72°	1.00	
8	CLEVIS	0.16	64°	0.50	

* Degree location of maximum axial depth measurement

Table A-5
RSRM-1A Aft Segment Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1800 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		
Segment: Aft		

					Comment Number
NBR Inhibitor					17
A. Number of radial tears over 3 inches long	0				
B. Tears exhibiting charring or erosion?	____	yes	X	no	____
C. Circumferential tears?	____	yes	X	no	____
D. Delaminations or separations?	____	yes	X	no	____
Insulated Cylinder Region					
A. Blisters visible?	____	yes	X	no	____
B. Discolorations or repairs visible?	____	yes	X	no	____
C. Separations or delaminations?	____	yes	X	no	____
D. Excessive erosion at factory joints?	____	yes	X	no	____
E. Tears (gouges/cuts)?	____	yes	X	no	____
Aft Dome Region					
A. Abnormal CF/EPDM erosion (pocket,	____	yes	X	no	____
B. NBR under CF/EPDM exposed?	____	yes	X	no	____

Comments:

17. NBR Inhibitor Heights:

Degree	Height (Inches)	Degree	Height (Inches)
0°	6.5	180°	4.5
30°	4.3	210°	5.0
60°	3.8	240°	5.3
90°	4.5	270°	8.0
120°	4.0	300°	7.5
150°	4.5	330°	7.5

60°	3.8	Minimum
14°, 42°, & 270°	8.0	Maximum

Table A-6
RSRM-1A Aft Center Segment Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1625 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
NBR Inhibitor						18
A. Number of radial tears over 3 inches long	4					19
B. Tears exhibiting charring or erosion?		yes	X	no		
C. Circumferential tears?		yes	X	no		
D. Delaminations or separations?		yes	X	no		
Insulated Cylinder Region						
A. Blisters visible?		yes	X	no		
B. Discolorations or repairs visible?		yes	X	no		
C. Separations or delaminations?		yes	X	no		
D. Excessive erosion at factory joints?		yes	X	no		
E. Tears (gouges/cuts)?	X	yes		no		20
Flap Region						
A. Gouges?		yes	X	no		
B. Pocketing?		yes	X	no		
C. Tears?		yes	X	no		
D. Missing material?	X	yes		no		21
E. Heat affected CF/EPDM	X	yes		no		
F. Eroded CF/EPDM?	X	yes		no		
G. Missing CF/EPDM?	X	yes		no		
H. Exposed CF/EPDM?	X	yes		no		
I. Bulb separations, voids, delaminations?		yes	X	no		

Comments:
18. NBR Inhibitor Heights:

Degree	Height (Inches)	Degree	Height (Inches)
0°	15.0	180°	12.0
30°	14.5	210°	12.5
60°	15.0	240°	14.0
90°	15.0	270°	15.0
120°	14.0	300°	15.0
150°	12.5	330°	15.5

180°	12.0	Minimum
330°	15.5	Maximum

Table A-6 (Cont'd)
RSRM-1A Aft Center Segment Internal Insulation Evaluation

19. NBR Inhibitor Tears

Degree	Inhibitor Height	Radial Length of Tear	Circumferential Coverage of Tear
164°	12.5"	4.0"	0.0"
172°	13.5"	4.0"	0.0"
187°	12.5"	5.0"	2.0"
194°	12.5"	5.0	1.5"

20. Gouge/cut in the insulation surface located 42 inches forward of the tip of tang at 20° (3.5 inches axial x 1.0 inch circumferential, approximately 0.1 inch thick material sticking out). Apparent sooting within cut, appears to have occurred after motor burn due to sharp jagged edge of the cut.

21. CF/EPDM was missing for 70% of the circumference; remaining from approximately 110° through 160°. The portion of the CF/EPDM remaining appeared to be heat affected.

Table A-7
RSRM-1A Forward Center Segment Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1800 Hours

Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston

					Comment Number
NBR Inhibitor					22
A. Number of radial tears over 3 inches long	17				23
B. Tears exhibiting charring or erosion?		yes	X	no	
C. Circumferential tears?		yes	X	no	
D. Delaminations or separations?		yes	X	no	
Insulated Cylinder Region					
A. Blisters visible?		yes	X	no	
B. Discolorations or repairs visible?		yes	X	no	
C. Separations or delaminations?		yes	X	no	
D. Excessive erosion at factory joints?		yes	X	no	
E. Tears (gouges/cuts)?		yes	X	no	
Flap Region					
A. Gouges?		yes	X	no	
B. Pocketing?		yes	X	no	
C. Tears?		yes	X	no	
D. Missing material?	X	yes		no	24
E. Heat affected CF/EPDM	X	yes		no	
F. Eroded CF/EPDM?		yes	X	no	25
G. Missing CF/EPDM?		yes	X	no	
H. Exposed CF/EPDM?	X	yes		no	
I. Bulb separations, voids, delaminations?		yes	X	no	

Comments:

22. NBR Inhibitor Heights - measured radially outboard from the clevis I.D.:

Degree	Height (Inches)	Degree	Height (Inches)
0°	17.0	180°	21.0
30°	25.0	210°	21.0
60°	24.0	240°	23.0
90°	22.7	270°	23.3
120°	24.0	300°	22.5
150°	20.0	330°	23.0

340°	16.5	Minimum
30°	25.0	Maximum

Table A-7 (Cont'd)
RSRM-1A Center Segment Internal Insulation Evaluation

23. NBR Inhibitor Tears

Degree	Inhibitor Height	Radial Length of Tear	Circumferential Coverage of Tear
12°	26.0"	20.0"	0.0"
30°	25.0"	11.0"	3.0"
40°	25.0"	19.5"	5.0"
52°	25.0"	9.0"	2.0"
78°	23.0"	16.5"	0.0"
94°	23.8"	19.5"	5.0"
110°	25.0"	7.0"	0.0"
120°	24.0"	3.0"	1.5"
130°	22.0"	16.0"	5.3"
158°	19.5"	11.5"	4.0"
186°	23.5"	17.0"	1.0"
212°	24.3"	17.0"	2.0"
230°	25.5"	8.5"	7.5"
236°	23.0"	18.0"	5.0"
268°	23.0"	17.5"	3.0"
292°	22.5"	18.5"	2.5"
324°	22.5"	18.0"	0.0"

24. Missing Flap - measured from the tip of the tang to the aft edge of the remaining flap:

Degree	Distance to Aft Edge of Flap
0°	10.5"
90°	12.0"
180°	11.5"
270°	10.5"

25. CF/EPDM was present full circumference.

Table A-8
RSRM-1A Forward Segment Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 09 October 1988	Time: 1800 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
Liner					
A. Burnback symmetrical?	X	yes		no	
B. Eleven point star burn out pattern visible?	X	yes		no	
Insulated Cylinder Region					
A. Blisters visible?		yes	X	no	
B. Discolorations or repairs visible?		yes	X	no	
C. Separations or delaminations?		yes	X	no	
D. Excessive erosion at factory joints?		yes	X	no	
E. Tears (gouges/cuts)?		yes	X	no	
Flap Region					
A. Gouges?		yes	X	no	
B. Pocketing?		yes	X	no	
C. Tears?	X	yes		no	26
D. Missing material?		yes	X	no	
E. Heat affected NBR under flap?	X	yes		no	
F. Bulb separations, voids, delaminations?		yes	X	no	

Comments:

26. The stress relief flap including the castable inhibitor slot was present full circumference with no significant erosion. The castable inhibitor was completely missing full circumference including the material normally present in the castable inhibitor slot. Numerous axial tears in the flap were present. Measurements of these tears are shown below:

Table A-8 (Cont'd)
RSRM-1A Forward Segment Internal Insulation Evaluation

Degree	Distance to Flap from Aft End of Tang	Axial Length of Tear	Degree	Distance to Flap from Aft End of Tang	Axial Length of Tear
0°	6.6"	3.3"	146°	4.6"	2.5"
5°	7.0"	2.8"	148°	4.5"	2.7"
8°	4.0"	7.3"	149°	4.7"	4.9"
10°	7.1"	3.8"	150°	4.5"	3.0"
16°	6.2"	3.0"	152°	4.6"	6.3"
19°	4.4"	4.5"	159°	4.7"	3.0"
22°	5.1"	5.4"	160°	4.5"	7.0"
23°	4.9"	4.7"	165°	4.4"	5.0"
26°	6.7"	4.3"	169°	4.0"	9.1"
30°	5.5"	7.0"	177°	3.1"	3.3"
33°	4.9"	4.5"	180°	2.8"	4.2"
34°	5.3"	6.0"	181°	2.9"	6.0"
36°	5.7"	4.0"	183°	4.1"	2.2"
38°	4.8"	6.0"	186°	2.6"	6.9"
40°	6.4"	8.0"	189°	3.5"	2.5"
44°	6.1"	4.5"	192°	3.5"	9.2"
50°	5.8"	8.8"	194°	3.6"	5.9"
58°	5.8"	9.8"	200°	3.1"	3.6"
76°	6.1"	3.5"	216°	3.5"	2.7"
78°	5.3"	3.0"	218°	2.4"	8.3"
79°	4.7"	7.2"	224°	3.6"	7.7"
82°	5.0"	5.8"	230°	3.7"	5.9"
85°	4.9"	6.4"	239°	3.4"	7.8"
88°	5.2"	8.2"	240°	3.3"	6.0"
92°	4.9"	7.3"	252°	3.1"	7.7"
94°	4.5"	4.0"	256°	3.1"	4.3"
96°	4.8"	1.5"	258°	3.4"	6.8"
97°	4.9"	4.0"	264°	2.8"	1.9"
98°	4.9"	6.2"	267°	3.3"	7.9"
99°	4.7"	2.8"	270°	2.6"	2.8"
109°	5.4"	1.7"	278°	3.1"	3.3"
113°	5.6"	5.0"	279°	2.8"	4.7"
116°	5.4"	3.5"	283°	3.2"	9.6"
118°	5.5"	6.5"	300°	3.9"	8.8"
120°	5.4"	5.5"	308°	3.4"	1.6"
122°	5.2"	6.5"	311°	3.6"	6.7"
124°	5.0"	4.5"	318°	3.5"	7.5"
127°	5.4"	6.5"	325°	3.4"	5.9"
132°	5.0"	6.3"	335°	3.2"	8.5"
133°	4.9"	2.5"	341°	2.9"	7.5"
136°	4.7"	4.4"	346°	5.1"	7.5"
140°	5.0"	4.5"	351°	6.5"	4.4"
142°	5.2"	7.8"	356°	5.5"	5.2"
144°	4.9"	6.1"			

Table A-9
RSRM-1A Aft Dome Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 22 November 1988	Time: 1915 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	____	no	Not Present

Notes/Comments:

1. Evidence of rust on the metal parts (external) for the full circumference.

Table A-10
RSRM-1A Aft Segment Stiffener to Stiffener Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 22 November 1988	Time: 2330 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	____	no	Not Present

Notes/Comments:

1. Small amounts of rust evident adjacent to tip of clevis O.D.

Table A-11
RSRM-1A Aft Segment ET Attach to Stiffener Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 23 November 1988	Time: 0400 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	____	no	Not Present

Notes/Comments:

1. Evidence of rust on metal parts (external) for full circumference.
   Heavy 18° - 68°, 270° - 0°
   Light 68° - 106°, 194° - 270°, 0° - 18°
   Not quite as severe as aft dome factory joint.

Table A-12
RSRM-1A Aft Center Segment Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 9 December 1988	Time: 0740 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	X	no	____

Notes/Comments:

1. Flashing evident intermittently around the circumference.

2. No voids are present on either the clevis or tang side where the weatherseal is vulcanized.

Table A-13
RSRM-1A Forward Center Segment Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 16 December 1988	Time: 2200 Hours
Inspector(s): Jim Passman		

					Comment Numbers
1. Gas paths?	___	yes	X	no	___
2. Soot?	___	yes	X	no	___
3. Heat Affected Material?					
A. Tang	___	yes	X	no	___
B. Clevis	___	yes	X	no	___
4. Foreign Material?	___	yes	X	no	___
5. Ply Separations?	___	yes	X	no	___
6. Unbonds?	___	yes	X	no	___
7. Teflon Tape Condition (Tang)	X	yes	___	no	1

Notes/Comments:

1. Teflon tape was intact and in place for the full circumference on the tang interface.
2. No rust contamination present.

Table A-14
RSRM-1A Forward Segment Cylinder to Cylinder Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 17 January 1989	Time: 1800 Hours
Inspector(s): Kevin Albrechtsen, Scott Manz		

					Comment Numbers
1. Gas paths?	___	yes	X	no	___
2. Soot?	___	yes	X	no	___
3. Heat Affected Material?					
A. Tang	___	yes	X	no	___
B. Clevis	___	yes	X	no	___
4. Foreign Material?	___	yes	X	no	___
5. Ply Separations?	___	yes	X	no	___
6. Unbonds?	___	yes	X	no	___
7. Teflon Tape Condition (Tang)	X	yes	___	no	1

Notes/Comments:

1. Teflon tape present on tang full circumference.
2. NBR flashing was present on the clevis tip intermittent full circumference.
3. Almost no rust contamination present.

Table A-15
RSRM-1A Forward Dome Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1A	Date: 17 January 1989	Time: 1430 Hours
Inspector(s): Kevin Albrechtsen		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	X	yes	____	no	2

Notes/Comments

1. NBR flashing was present on the clevis tip for most of the circumference. Intermittent to primary O-ring.

2. Teflon tape present on tang full circumference.

3. Very little rust contamination present.

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
AFT SEGMENT							
106423-12	25	AFT		FIELD	CLEVIS	240-0	PHOTO #25 240-0 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106423-11	24	AFT		FIELD	CLEVIS	120-240	PHOTO #24 120-240 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106423-10	23	AFT		FIELD	CLEVIS	0-120	PHOTO #23 0-120 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106423-09	22	AFT		FIELD	CLEVIS	360	PHOTO #22 360 DEG. NBR INHIBITOR - CLEVIS CYLINDER
107329-03	00	AFT			CLEVIS	90-100	
107333-01	00	AFT		FACTORY # 5	BOTH	120-0	TANG AND CLEVIS INSULATION
107333-02	00	AFT		FACTORY # 5	BOTH	240-120	TANG AND CLEVIS INSULATION
107333-03	00	AFT		FACTORY # 5	BOTH	0-240	TANG AND CLEVIS INSULATION
107333-05	00	AFT		FACTORY # 5	CLEVIS	96	RUST IN CLEVIS BOTTOM
107333-06	00	AFT		FACTORY # 5	CLEVIS	0	TYPICAL CLEVIS WITH O-RINGS
107333-07	00	AFT		FACTORY # 5	CLEVIS	278	SCRATCH ON LANDS FORWARD AND BETWEEN O-RING GROOVES
107333-04	00	AFT		FACTORY # 5	TANG	0	TYPICAL TANG SEALING SURFACE
107329-07	00	AFT		FACTORY # 6	BOTH	120-0	TANG AND CLEVIS INSULATION
107329-08	00	AFT		FACTORY # 6	BOTH	0-240	TANG AND CLEVIS INSULATION
107329-09	00	AFT		FACTORY # 6	BOTH	240-120	TANG AND CLEVIS INSULATION
107329-01	00	AFT		FACTORY # 6	CLEVIS	0	TYPICAL INNER CLEVIS LEG AND O-RINGS 0
107329-02	00	AFT		FACTORY # 6	TANG	0	TYPICAL TANG SEALING SURFACE 0 DEGREES
107330-01	00	AFT		FACTORY # 7	BOTH	120-0	TANG AND CLEVIS INSULATION
107330-02	00	AFT		FACTORY # 7	BOTH	0-240	TANG AND CLEVIS INSULATION
107330-03	00	AFT		FACTORY # 7	BOTH	240-120	TANG AND CLEVIS INSULATION
107329-04	00	AFT		FACTORY # 7	CLEVIS	0	TYPICAL INNER CLEVIS 0 DEG. RUST ON SECONDARY O-RING GROOVE
107329-05	00	AFT		FACTORY # 7	CLEVIS	0	
107330-04	00	AFT		FACTORY # 7	CLEVIS	242	SCRATCHES ON LAND BETWEEN AND RUST ON SECONDARY O-RING GROOVE
107330-05	00	AFT		FACTORY # 7	CLEVIS	230	RUST ON LAND BETWEEN O-RINGS 230 DEGREES
107330-06	00	AFT		FACTORY # 7	CLEVIS	273-280	RUST, CHEMLOK AND INSULATION ON LAND FORWARD OF PRIMARY O-RING
107329-06	00	AFT		FACTORY # 7	TANG	0	TYPICAL INNER TANG SEALING SURFACE
AFT CTR SEGMENT							
106424-04	21	AFT CTR		FIELD	TANG	240-0	PHOTO #21 240-0 DEG. AFT CTR SEG. - FLAP CYLINDER TANG
106424-03	20	AFT CTR		FIELD	TANG	120-240	PHOTO #20 120-240 DEG. AFT CTR SEG. - FLAP CYLINDER TANG

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
106424-02	19	AFT CTR		FIELD	TANG	0-120	PHOTO #19 0-120 DEG. AFT CTR SEG. - FLAP CYLINDER TANG
106424-01	18	AFT CTR		FIELD	TANG	360	PHOTO #18 360 DEG. AFT CTR SEG. - FLAP CYLINDER TANG
106423-08	17	AFT CTR		FIELD	CLEVIS	240-0	PHOTO #17 240-0 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106423-07	16	AFT CTR		FIELD	CLEVIS	120-240	PHOTO #16 120-240 DEG. NBR INHIBITOR - CELVIS CYLINDER
106423-06	15	AFT CTR		FIELD	CLEVIS	0-120	PHOTO #15 0-120 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106423-05	14	AFT CTR		FIELD	CLEVIS	360	PHOTO #14 360 DEG. NBR INHIBITOR - CLEVIS CYLINDER
106426-01	00	AFT CTR				20	AFT CENTER SEGMENT GOUGE CUT IN INSULATION SURFACE AT 20 DEG
106414-01	00	AFT CTR		FACTORY # 4		190	AFT/CTR FACTORY JOINT/DEBRIS IMPACT TO CASE
107806-01	00	AFT CTR		FACTORY # 4		0-120	TANG AND CLEVIS INSULATION
107806-02	00	AFT CTR		FACTORY # 4		120-240	TANG AND CLEVIS INSULATION
107806-03	00	AFT CTR		FACTORY # 4		240-360	TANG AND CLEVIS INSULATION
FWD SEGMENT							
106418-08	05	FWD		FIELD	TANG	240-0	FORWARD SEGMENT TANG PHOTO #5 240-0 DEG
106419-01	05	FWD		FIELD	TANG	240-0	FORWARD FLAP CYLINDER AND TANG PHOT #5 240 - 0 DEGREES
106418-06	04	FWD		FIELD	TANG	120-240	FORWARD SEGMENT TANG PHOTO #4 120-240 DEG
106418-09	03	FWD		FIELD	TANG	0-120	FORWARD SEGMENT TANG PHOTO #3 0-120 DEG
106418-07	02	FWD		FIELD	TANG	360	FORWARD SEGMENT TANG PHOTO #2 360 DEG
106418-01	01	FWD			FWD DOME		FORWARD DOME INSULATION
106426-03	00	FWD			TANG	260	FORWARD SEGMENT/TANG EDGE OF FLAP - CASTABLE INHIBITOR SLOT 260 DEG
108304-01	00	FWD		FACTORY # 1	FWD DOME		TANG AND CLEVIS INSULATION
108304-02	00	FWD		FACTORY # 1	FWD DOME		TANG AND CLEVIS INSULATION
108304-03	00	FWD		FACTORY # 1	FWD DOME		TANG AND CLEVIS INSULATION
108349-01	00	FWD		FACTORY # 2			TANG AND CLEVIS INSULATION
108349-02	00	FWD		FACTORY # 2			TANG AND CLEVIS INSULATION
108349-03	00	FWD		FACTORY # 2			TANG AND CLEVIS INSULATION
106402-01	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
106402-02	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
106402-03	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
106402-04	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
106402-05	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
106402-06	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
106402-07	00	FWD		IGNITER-CASE	FWD DOME		IGNITER DISASSEMBLY FROM FORWARD DOME
FWD CTR SEGMENT							
106423-04	13	FWD CTR		FIELD	TANG	240-0	PHOTO #13 240-0 DEG. FORWARD CENTER SEGMENT - FLAP CYLINDER TANG
106423-03	12	FWD CTR		FIELD	TANG	120-240	PHOTO #12 120-240 DEG. FORWARD CENTER SEGMENT - FLAP CYLINDER TANG
106423-02	11	FWD CTR		FIELD	TANG	0-120	PHOTO #11 0-120 DEG. FORWARD CENTER SEGMENT - FLAP CYLINDER TANG
106423-01	10	FWD CTR		FIELD	TANG	360	PHOTO #10 360 DEG. FORWARD CENTER SEGMENT FLAP CYCLINDER TANG
106418-03	09	FWD CTR		FIELD	CLEVIS	240-0	FORWARD CENTER CLEVIS PHOTO #9 240-0 DEG
106418-04	08	FWD CTR		FIELD	CLEVIS	120-240	FORWARD CENTER CLEVIS PHOTO #8 120-240 DEG
106418-02	07	FWD CTR		FIELD	CLEVIS	0-120	FORWARD CENTER CLEVIS PHOTO #7 0-120 DEG
106418-05	06	FWD CTR		FIELD	CLEVIS	360	FORWARD CENTER CLEVIS PHOTO #6 360 DEG
106426-02	00	FWD CTR			CLEVIS	270	FORWARD CENTER SEGMENT CLEVIS - SOOT WITHIN BONDLINE 270 DEG
107915-04	00	FWD CTR		FACTORY # 3		270	TANG AND CLEVIS INSULATION
107915-05	00	FWD CTR		FACTORY # 3		180	TANG AND CLEVIS INSULATION
107915-06	00	FWD CTR		FACTORY # 3		90	TANG AND CLEVIS INSULATION
107915-07	00	FWD CTR		FACTORY # 3		0	TANG AND CLEVIS INSULATION
IGNITER SEGMENT							
106401-01	00	IGNITER		IGNITER-CASE			CORROSION ON ADAPTER
106401-02	00	IGNITER		IGNITER-CASE	N/A	285	CORROSION ON ADAPTER - OUTER JOINT PUTTY BLOWHOLE 285 DEGREES
106401-03	00	IGNITER		IGNITER-CASE	N/A		CORROSION ON ADAPTER
106401-04	00	IGNITER		IGNITER-CASE	N/A	220-310	CORROSION ON ADAPTER - SOOT AFT SIDE OF OUTER SEAL 220-310 DEGREES
106401-05	00	IGNITER		IGNITER-CASE	N/A	270-330	CORROSION ON ADAPTER - SOOT FORWARD SIDE OF OUTER SEAL 270-330 DEGREES
106401-06	00	IGNITER		IGNITER-CASE	N/A	220-310	SOOT AFT SIDE OF OUTER SEAL 220 - 310 DEGREES
106401-07	00	IGNITER		IGNITER-CASE	N/A	220-310	SOOT AFT SIDE OF OUTER SEAL 220 - 310 DEGREES
106401-08	00	IGNITER		IGNITER-CASE	N/A		CORROSION ON ADAPTER - OUTER GASK-O-SEAL FORWARD SIDE
106401-09	00	IGNITER		IGNITER-CASE	N/A	270-330	CORROSION ON ADAPTER - SOOT TO FWD SIDE OF OUTER SEAL 270-330 DEGREES
106401-10	00	IGNITER		IGNITER-CASE	N/A	270-330	CORROSION ON ADAPTER - SOOT TO FWD SIDE OF OUTER SEAL 270-330 DEGREES

END OF REPORT

Appendix B

RSRM-1B Insulation Evaluations

Table B-1
RSRM-1B Nozzle to Case Joint Insulation Evaluation

Motor No.: RSRM-1B	Date: 12 October 1988	Time: 0700 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1.	Voids?	X	yes		no	28
2.	Gas paths?		yes	X	no	
3.	Soot?		yes	X	no	
4.	Foreign material?		yes	X	no	
5.	Porosity (adhesive)?	X	yes		no	29
6.	Aft dome edge unbonds?		yes	X	no	30
7.	Baffle intact?	X	yes		no	
8.	Polysulfide in vent slots?	X	yes		no	31
9.	Polysulfide failure mode	10 % adhesive w/ aft dome		90 % cohesive		

Comments:

28. Polysulfide voids

VOID	DEGREE	LONGITUDINAL LENGTH	CIRCUMFERENTIAL WIDTH	DISTANCE FROM STEP
1	3.6°	0.19	0.09	0.72
2	12.6°	1.03	0.34	0.28 UP RAMP
3	21.6°	0.28	0.13	1.13
4	37.8°	0.25	0.13	0.13 UP RAMP
5	54.0°	0.47	0.19	0.38
6	61.2°	SMALL VOID LENGTH OF RAMP		
7	79.2	SMALL VOID LENGTH OF RAMP		
8	221.4°	0.44	0.16	0.09
9	223.2°	0.25	0.13	0.34
10	289.8°	SMALL VOID LENGTH OF RAMP		
11	300.6°	0.25	0.09	0.16
12	309.6°	SMALL VOID LENGTH OF RAMP		
13	318.6°	0.38	0.16	0.38
14	322.2°	SMALL		
15	324.0°	SMALL		
16	325.8°	0.19	0.13	INBOARD SIDE OF RAMP
17	333.0°	SMALL		
18	336.6°	0.16	0.09	0.22
19	340.2°	0.16	0.09	0.13
20	347.4°	0.34	0.13	AT RAMP

29. Small amount of porosity was evident in the step region.

30. This inspection was performed at H-7 Clearfield. No unbonds were found.

Table B-1 (Cont'd)
RSRM-1B Nozzle to Case Joint Insulation Evaluation

31. Polysulfide vent slot fill

DEGREE LOCATION	% SLOT FILL	DEGREE LOCATION	% SLOT FILL	DEGREE LOCATION	% SLOT FILL
0	95	122.4	50	244.8	100
7.2	70	129.6	70	252.0	100
14.4	100	136.8	90	259.2	80
21.6	100	144.0	50	266.4	100
28.8	100	151.2	40	273.6	40
36.0	100	158.4	40	280.8	40
43.2	100	165.6	90	288.0	100
50.4	100	172.8	40	295.2	100
57.6	100	180.0	20	302.4	100
64.8	90	187.2	80	309.6	75
72.0	75	194.4	80	316.8	100
79.2	60	201.6	80	324.0	80
86.4	60	208.8	80	331.2	10
93.6	50	216.0	100	338.4	100
100.8	40	223.2	100	345.6	100
108.0	100	230.4	95	352.8	100
115.2	50	237.6	100		

Average = 78% Maximum = 100% Minimum = 10%

Table B-2
RSRM-1B Aft Field Joint Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 0900 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1.	Areas of non-contact?	X	yes		no	32
2.	Gas paths?		yes	X	no	
3.	Soot?		yes	X	no	
4.	Heat affected material (color)?					
	A. Tang	X	yes		no	33
	B. Clevis	X	yes		no	34
5.	Foreign material?		yes	X	no	
6.	Crazing		yes	X	no	
7.	Clevis edge unbonds	X	yes		no	35

Comments:

32. Minimal areas of non-contact evident inboard of the radius region for the full circumference with contact outboard of this location through the radius region. Contact at J-leg evident full circumference.

33. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	2.85	NO CHAR	2.50	1.15
90	3.15	2.90	2.40	2.00
180	3.25	2.95	2.45	1.25
270	2.90	NO CHAR	2.30	1.00

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

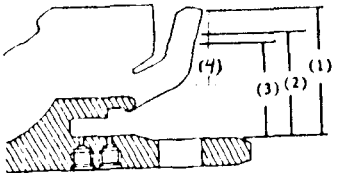


Table B-2
RSRM-1B Aft Field Joint Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 0900 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1.	Areas of non-contact?	X	yes		no	32
2.	Gas paths?		yes	X	no	
3.	Soot?		yes	X	no	
4.	Heat affected material (color)?					
	A. Tang	X	yes		no	33
	B. Clevis	X	yes		no	34
5.	Foreign material?		yes	X	no	
6.	Crazing		yes	X	no	
7.	Clevis edge unbonds	X	yes		no	35

Comments:

32. Minimal areas of non-contact evident inboard of the radius region for the full circumference with contact outboard of this location through the radius region. Contact at J-leg evident full circumference.

33. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	2.85	NO CHAR	2.50	1.15
90	3.15	2.90	2.40	2.00
180	3.25	2.95	2.45	1.25
270	2.90	NO CHAR	2.30	1.00

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

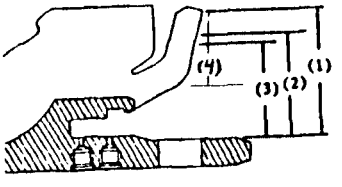
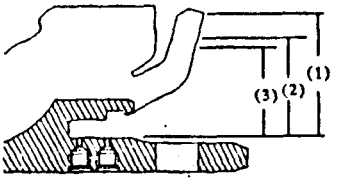


Table B-2 (Cont'd)
RSRM-1 Aft Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.703	2.565	180		2.788	2.633
10		2.695	2.568	190		2.815	2.556
20		2.687	2.550	200		2.780	2.580
30		2.678	2.553	210		2.765	2.545
40		2.720	2.563	220		2.735	2.530
50		2.689	2.520	230		2.742	2.548
60		2.691	2.530	242		2.760	2.557
70		2.720	2.590	250		2.742	2.540
80		2.702	2.550	260		2.730	2.530
90		2.678	2.530	270		2.751	2.529
100		2.660	2.510	280		2.768	2.539
110		2.674	2.580	290		2.755	2.555
120		2.710	2.532	300		2.738	2.552
130		2.710	2.555	310		2.758	2.558
140		2.742	2.515	320		2.730	2.515
150		2.747	2.565	330		2.670	2.495
160		2.770	2.640	340		2.715	2.565
170		2.798	2.630	350		2.733	2.585



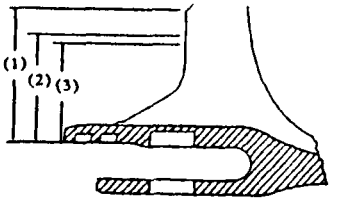
* No char remained after rinse.

34. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements were taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.759	2.428	180		2.740	2.455
10		2.689	2.445	190		2.799	2.514
20		2.715	2.538	200		2.760	2.595
30		2.701	2.560	210		2.753	2.413
40		2.760	2.590	220		2.727	2.433
50		2.714	2.515	230		2.681	2.394
60		2.763	2.534	242		2.688	2.478
70		2.749	2.511	250		2.708	2.451
80		2.744	2.546	260		2.708	2.364
90		2.708	2.586	270		2.770	2.322
100		2.725	2.486	280		2.809	2.670
110		2.704	2.410	290		2.760	2.532
120		2.723	2.406	300		2.773	2.411
130		2.741	2.442	310		2.794	2.352
140		2.769	2.478	320		2.772	2.362
150		2.747	2.524	330		2.829	2.449
160		2.805	2.583	340		2.886	2.473
170		2.785	2.556	350		2.765	2.569



C-3

Table B-2 (Cont'd)
RSRM-1 Aft Field Joint Insulation Evaluation

35. Preliminary KSC Clevis Edge Separations

edge unbond	segment end	max. axial depth (in)	*degree location	circ. width (in)	degree arc
1	CLEVIS	0.20	6°	3.25	
2	CLEVIS	0.20	10°	2.00	
3	CLEVIS	0.19	17°	1.00	
4	CLEVIS	0.20	22°	2.00	
5	CLEVIS	0.15	26°	1.00	
6	CLEVIS	0.21	30°	1.00	
7	CLEVIS	0.21	54°	1.50	
8	CLEVIS	0.18	96°	0.75	
9	CLEVIS	0.17	126°	2.00	
10	CLEVIS	0.21	136°	4.00	
11	CLEVIS	0.24	180°	3.00	
12	CLEVIS	0.22	186°	6.00	
13	CLEVIS	0.18	192°	2.00	
14	CLEVIS	0.25	199°	2.50	
15	CLEVIS	0.21	212°	2.25	
16	CLEVIS	0.20	216°	3.00	
17	CLEVIS	0.20	221°	3.00	
18	CLEVIS	0.13	236°	1.00	
19	CLEVIS	0.13	244°	1.00	
20	CLEVIS	0.23	278°	1.80	
21	CLEVIS	0.19	280°	0.50	
22	CLEVIS	0.20	296°	1.00	
23	CLEVIS	0.20	318°	1.50	
24	CLEVIS	0.19	319°	2.00	
25	CLEVIS	0.17	327.5°	0.40	
26	CLEVIS	0.18	328.5°	0.40	
27	CLEVIS	0.18	340°	0.40	
28	CLEVIS	0.20	353°	2.50	

* Degree location of maximum axial depth measurement

Table B-3
RSRM-1B Center Field Joint Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 1100 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1.	Areas of non-contact?	X	yes		no	36
2.	Gas paths?		yes	X	no	
3.	Soot?		yes	X	no	
4.	Heat affected material (color)?					
	A. Tang	X	yes		no	37
	B. Clevis	X	yes		no	38
5.	Foreign material?		yes	X	no	
6.	Crazing?		yes	X	no	
7.	Clevis edge unbonds?	X	yes		no	39

Comments:

36. Minimal areas of non-contact evident inboard of the radius region for the full circumference with contact outboard of this location through the radius region. Contact at J-leg tip evident full circumference.

37. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	3.10	NO CHAR	2.52	1.12
90	3.16	NO CHAR	2.43	1.14
180	3.16	NO CHAR	2.58	1.10
270	3.14	NO CHAR	2.80	1.10

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

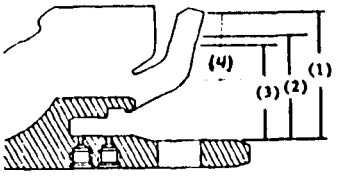
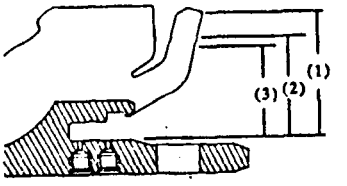


Table B-3 (Cont'd)
RSRM-1B Center Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.954	2.596	180		3.055	2.620
10		2.948	2.589	190		3.053	2.622
20		2.970	2.623	200		2.941	2.655
30		2.981	2.612	210		2.938	2.695
40		2.959	2.621	220		2.945	2.606
50		2.979	2.594	230		2.957	2.726
60		2.972	2.651	242		2.960	2.681
70		2.997	2.700	250		2.946	2.662
80		3.000	2.674	260		2.956	2.660
90		3.020	2.640	270		2.995	2.645
100		2.997	2.634	280		2.988	2.632
110		2.948	2.589	290		2.954	2.640
120		2.992	2.588	300		2.955	2.588
130		2.982	2.592	310		3.002	2.676
140		2.977	2.607	320		2.983	2.663
150		3.060	2.610	330		2.994	2.693
160		3.035	2.587	340		2.957	2.606
170		2.937	2.708	350		2.957	2.613



* No char remained after rinse.

38. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements have taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		2.988	2.835	180		2.960	2.858
10		2.930	2.880	190		2.985	2.810
20		2.930	2.800	200		2.970	2.848
30		2.938	2.790	210		2.985	2.890
40		2.950	2.795	220		2.980	2.858
50		2.952	2.882	230		2.976	2.860
60		2.940	2.802	242		2.980	2.878
70		3.005	2.920	250		2.975	2.875
80		2.980	2.880	260		2.960	2.885
90		3.010	2.975	270		2.982	2.860
100		3.003	2.803	280		2.990	2.888
110		2.968	2.860	290		2.990	2.850
120		2.968	2.847	300		2.969	2.880
130		2.980	2.870	310		2.982	2.874
140		2.993	2.815	320		2.994	2.902
150		2.960	2.825	330		2.970	2.882
160		2.970	2.842	340		2.980	2.855
170		2.978	2.813	350		2.940	2.825

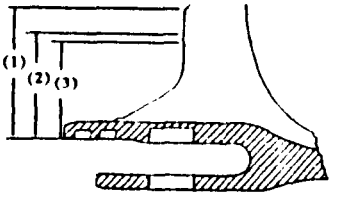


Table B-3 (Cont'd)
RSRM-1B Center Field Joint Insulation Evaluation

39. KSC Preliminary Clevis Edge Separations

EDGE UNBOND	SEGMENT END	MAX. AXIAL DEPTH (IN)	*DEGREE LOCATION	CIRC. WIDTH (IN)	DEGREE ARC
1	CLEVIS	0.16	97°	0.38	
2	CLEVIS	0.14	118°	0.25	
3	CLEVIS	0.16	136°	0.25	
4	CLEVIS	0.20	166°	0.20	
5	CLEVIS	0.20	171°	0.15	
6	CLEVIS	0.14	204°	0.15	
7	CLEVIS	0.14	274°	0.15	
8	CLEVIS	0.15	348°	0.12	

* Degree location of maximum axial depth measurement

Table B-4
RSRM-1B Forward Field Joint Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 0700 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
1.	Areas of non-contact?	X	yes		no	40
2.	Gas Paths?		yes	X	no	
3.	Soot?	X	yes		no	41
4.	Heat affected material (color)?					
	A. Tang	X	yes		no	42
	B. Clevis	X	yes		no	43
5.	Foreign Material?		yes	X	no	
6.	Crazing?		yes	X	no	
7.	Clevis edge unbonds?	X	yes		no	44

Comments:

40. Minimal areas of non-contact evident inboard of the radius region for the full circumference with contact outboard of this location through the radius region. Contact at J-leg tip evident full circumference.

41. Soot deposits extending down the bondline into the start of the radius were identified at several locations around the circumference, Figure 5. These sooted regions frequently corresponded to large radial inhibitor tears or areas where a portion of the NBR inhibitor was torn away.

42. Tang measurements indicating heat affected material:

KSC Preliminary
Tang End Measurements

Degree Location	Measurements (inches): (1)	(2)	(3)	(4)
0	3.25	NO CHAR	2.65	0.73
90	3.18	NO CHAR	2.90	1.06
180	3.07	3.00	2.54	1.15
270	3.18	NO CHAR	2.70	0.97

Measurements:
(1) To the tip of the remaining material
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)
(4) Bondline contact measurement outboard from remaining material.

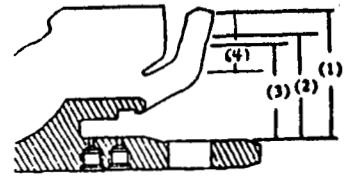
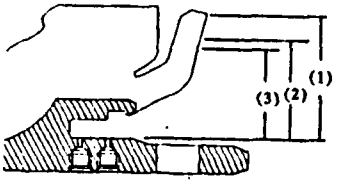


Table B-4 (Cont'd)
RSRM-1B Forward Field Joint Insulation Evaluation

Clearfield Final
Tang End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		3.055	2.874	180		2.920	2.741
10		3.012	2.739	190		2.825	2.620
20		2.981	2.691	200		2.928	2.618
30		2.955	2.659	210		2.980	2.758
40		3.009	2.732	220		2.990	2.815
50		3.005	2.705	230		2.978	2.780
60		3.000	2.689	242		3.010	2.850
70		3.021	2.791	250		3.030	2.820
80		3.001	2.760	260		2.984	2.755
90		3.007	2.861	270		3.006	2.772
100		3.015	2.851	280		3.008	2.610
110		3.000	2.833	290		3.018	2.730
120		3.004	2.791	300		3.039	2.870
130		3.001	2.791	310		3.031	2.700
140		3.006	2.899	320		3.031	2.820
150		3.004	2.810	330		3.021	2.780
160		2.952	2.735	340		3.042	2.835
170		2.890	2.714	350		3.045	2.770

* No char remained after rinse.



43. Clevis end measurements were not taken at KSC. The measurement method is inaccurate and the clevis side insulation performance mirrored the performance of the tang side. Clevis measurements were be taken at Clearfield H-7 and are shown below.

Measurements: (1)* Remaining char was rinsed out. Measurement was not taken.
(2) To the outboard edge of the char layer
(3) To the outboard edge of the heat affected material (i.e. measurement of the virgin material remaining)

Clearfield Final
Clevis End Measurements

Degree Location	Measurements: (1)*	(2)	(3)	Degree Location	Measurements: (1)*	(2)	(3)
2		3.085	2.868	180		3.010	2.830
10		3.111	2.900	190		3.070	2.825
20		3.075	2.856	200		3.075	2.902
30		3.040	2.830	210		3.072	2.898
40		3.048	2.838	220		3.071	2.885
50		3.060	2.890	230		3.075	2.895
60		3.070	2.856	242		3.088	2.878
70		3.099	2.887	250		3.098	2.865
80		3.048	2.889	260		3.085	2.878
90		3.062	2.815	270		3.125	2.900
100		3.053	2.950	280		3.100	2.915
110		3.060	2.903	290		3.110	2.850
120		3.030	2.838	300		3.082	2.855
130		3.070	2.853	310		3.105	2.830
140		3.038	2.918	320		3.098	2.905
150		3.062	2.912	330		3.103	2.890
160		3.060	2.868	340		3.105	2.858
170		3.045	2.868	350		3.110	2.868

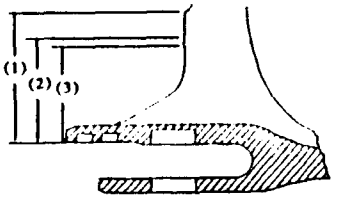


Table B-4 (Cont'd)
RSRM-1B Forward Field Joint Insulation Evaluation

44. KSC Preliminary Clevis Edge Separations

EDGE UNBOND	SEGMENT END	MAX. AXIAL DEPTH (IN)	*DEGREE LOCATION	CIRC. WIDTH (IN)	DEGREE ARC
1	CLEVIS	0.13	0°	1.20	
2	CLEVIS	0.10	1°	0.20	
3	CLEVIS	0.11	2°	0.20	
4	CLEVIS	0.14	4°	1.00	
5	CLEVIS	0.14	80°	1.00	
6	CLEVIS	0.13	84°	2.00	
7	CLEVIS	0.14	135°	0.30	
8	CLEVIS	0.14	136°	0.60	
9	CLEVIS	0.14	138°	0.20	
10	CLEVIS	0.11	193°	2.00	
11	CLEVIS	0.14	202°	0.20	
12	CLEVIS	0.14	208°	0.40	
13	CLEVIS	0.19	228°	0.80	
14	CLEVIS	0.10	231°	0.30	
15	CLEVIS	0.12	237°	0.20	
16	CLEVIS	0.13	242°	0.20	
17	CLEVIS	0.14	244°	2.00	
18	CLEVIS	0.10	246°-250°		
19	CLEVIS	0.16	255°	0.20	
20	CLEVIS	0.18	256°	0.30	
21	CLEVIS	0.10	276°	0.15	
22	CLEVIS	0.16	284°	0.15	
23	CLEVIS	0.14	350°	0.80	
24	CLEVIS	0.12	355°	0.20	
25	CLEVIS	0.12	356°	0.20	

* Degree location of maximum axial depth measurement

Table B-5
RSRM-1B Aft Segment Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 1300 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
NBR Inhibitor					45
A. Number of radial tears over 3 inches long	0				
B. Tears exhibiting charring or erosion?	____	yes	X	no	____
C. Circumferential tears?	____	yes	X	no	____
D. Delaminations or separations?	____	yes	X	no	____
Insulated Cylinder Region					
A. Blisters visible?	____	yes	X	no	____
B. Discolorations or repairs visible?	____	yes	X	no	____
C. Separations or delaminations?	____	yes	X	no	____
D. Excessive erosion at factory joints?	____	yes	X	no	____
E. Tears (gouges/cuts)?	____	yes	X	no	____
Aft Dome Region					
A. Abnormal CF/EPDM erosion (pocket, gouges)	____	yes	X	no	____
B. NBR under CF/EPDM exposed?	____	yes	X	no	____

Comments:

45. NBR Inhibitor Heights:

Degree	Height (Inches)	Degree	Height (Inches)
0°	4.5	180°	5.5
30°	4.5	210°	5.0
60°	6.5	240°	5.0
90°	4.2	270°	5.0
120°	4.5	300°	7.5
150°	5.0	330°	5.0

90°	4.2	Minimum
300°	7.5	Maximum

Table B-6
RSRM-1B Aft Center Segment Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 2100 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
NBR Inhibitor					46
A. Number of radial tears over 3 inches long	0				
B. Tears exhibiting charring or erosion?	____	yes	X	no	
C. Circumferential tears?	____	yes	X	no	
D. Delaminations or separations?	____	yes	X	no	
Insulated Cylinder Region					
A. Blisters visible?	____	yes	X	no	
B. Discolorations or repairs visible?	____	yes	X	no	
C. Separations or delaminations?	____	yes	X	no	
D. Excessive erosion at factory joints?	____	yes	X	no	
E. Tears (gouges/cuts)?	____	yes	X	no	
Flap Region					
A. Gouges?	____	yes	X	no	
B. Pocketing?	____	yes	X	no	
C. Tears?	____	yes	X	no	
D. Missing material?	X	yes	____	no	47
E. Heat affected CF/EPDM	X	yes	____	no	
F. Eroded CF/EPDM?	X	yes	____	no	
G. Missing CF/EPDM?	X	yes	____	no	48
H. Exposed CF/EPDM?	X	yes	____	no	
I. Bulb separations, voids, delaminations?	____	yes	X	no	

Comments:

46. NBR Inhibitor Heights:

Degree	Height (Inches)	Degree	Height (Inches)
0°	11.3	180°	14.3
30°	13.5	210°	13.5
60°	12.5	240°	16.3
90°	13.5	270°	15.8
120°	13.4	300°	13.0
150°	12.8	330°	12.0

0°	11.3	Minimum
240°	16.3	Maximum

Table B-6 (Cont'd)
RSRM-1B Aft Center Segment Internal Insulation Evaluation

47. Stress relief flap measurements - taken from the tip of the tang forward to the aft edge of the flap. Measure of missing flap material.

Degree	Axial Distance (inches)
0°	15
90°	15.5
180°	15
270°	14.8

48. CF/EPDM was missing full circumference.

Table B-7
RSRM-1B Forward Center Segment Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 10 October 1988	Time: 0845 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

						Comment Number
NBR Inhibitor						49
A. Number of radial tears over 3 inches long	11					50
B. Tears exhibiting charring or erosion?		yes	X	no		
C. Circumferential tears?		yes	X	no		
D. Delaminations or separations?		yes	X	no		
Insulated Cylinder Region						
A. Blisters visible?		yes	X	no		
B. Discolorations or repairs visible?		yes	X	no		
C. Separations or delaminations?		yes	X	no		
D. Excessive erosion at factory joints?		yes	X	no		
E. Tears (gouges/cuts)?	X	yes		no		51
Flap Region						
A. Gouges?		yes	X	no		
B. Pocketing?		yes	X	no		
C. Tears?		yes	X	no		
D. Missing material?	X	yes		no		52
E. Heat affected CF/EPDM	X	yes		no		53
F. Eroded CF/EPDM?		yes	X	no		
G. Missing CF/EPDM?		yes	X	no		
H. Exposed CF/EPDM?	X	yes		no		
I. Bulb separations, voids, delaminations?		yes	X	no		

Comments:

49. NBR Inhibitor Heights - measured radially outboard from the clevis I.D.:

Degree	Height (Inches)	Degree	Height (Inches)	
0°	20.8	180°	25.5	
30°	20.5	210°	26.5	
60°	23.5	240°	25.5	
90°	25.0	270°	22.0	
120°	26.0	300°	26.8	
150°	24.5	330°	22.0	
340°	16.5			Minimum
287°	28.5			Maximum

Table B-7 (Cont'd)
RSRM-1B Forward Center Segment Internal Insulation Evaluation

50. NBR Inhibitor Tears

Degree	Inhibitor Height	Radial Length of Tear	Circumferential Coverage of Tear
73°	25.5"	21.0"	7.0"
110°	25.0"	18.8"	4.0"
146°	21.3"	12.0"	0.0"
166°	20.5"	13.5"	0.0"
190°	25.0"	3.0"	0.0"
200°	26.8"	20.5"	0.0"
232°	26.0"	16.0"	1.0"
278°	26.5"	12.0"	0.0"
287°	28.5"	8.0"	0.0"
300°	26.8"	18.0"	3.0"
324°	27.3"	20.0"	4.5"

51. Gouge/cut in the insulation surface located 48 inches aft of the inhibitor base interior at 170° (4.0 inches axial x 0.1 inch circumferential, approximately 0.1 inch thick material sticking out). Appears to have occurred after motor burn due to sharp jagged edge of the cut.

52. Missing Flap - measured from the tip of the tang to the aft edge of the remaining flap:

Degree	Distance to Aft Edge of Flap
0°	12.5"
90°	12.5"
180°	13.0"
270°	11.0"

53. CF/EPDM was present full circumference.

Table B-8
RSRM-1B Forward Segment Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 09 October 1988	Time: 1800 Hours
Inspectors: Virginia Chandler, Norm Eddy, Cary Ralston		

					Comment Number
Liner					
A. Burnback symmetrical?	X	yes		no	
B. Eleven point star burn out pattern visible?	X	yes		no	
Insulated Cylinder Region					
A. Blisters visible?		yes	X	no	
B. Discolorations or repairs visible?		yes	X	no	
C. Separations or delaminations?		yes	X	no	
D. Excessive erosion at factory joints?		yes	X	no	
E. Tears (gouges/cuts)?	X	yes		no	54
Flap Region					
A. Gouges?		yes	X	no	
B. Pocketing?		yes	X	no	
C. Tears?	X	yes		no	55
D. Missing material?		yes	X	no	
E. Heat affected NBR under flap?	X	yes		no	
F. Bulb separations, voids, delaminations?		yes	X	no	

Comments:

54. Gouge/cut in the insulation surface located 107 inches forward from the tip of tang at 330° (9.0 inches axial x 1.0 inch circumferential, approximately 0.05 inch thick material sticking out). Appears to have occurred after motor burn due to sharp jagged edge of the cut. Appears to be mostly liner.

55. The stress relief flap including the castable inhibitor slot was present full circumference with no significant erosion. The castable inhibitor was completely missing full circumference including the material normally present in the castable inhibitor slot. Numerous axial tears are present. Measurements of these tears are shown below:

Table B-8 (Cont'd)
RSRM-1B Forward Segment Internal Insulation

Degree	Distance to Flap from Aft End of Tang	Length of Tear	Degree	Distance to Flap from Aft End of Tang	Length of Tear
0°	3.3"		194°	8.5"	4.0"
2°	3.3"	8.0"	196°	8.5"	3.0"
6°	4.8"	7.0"	208°	4.0"	7.0"
10°	4.3"	3.5"	212°	4.0"	4.0"
18°	4.3"	5.0"	217°	4.4"	6.5"
34°	6.0"	5.0"	219°	4.0"	4.5"
42°	6.3"	4.0"	225°	4.3"	7.0"
44°	6.5"	2.3"	227°	3.8"	8.0"
52°	5.0"	5.0"	231°	4.3"	5.0"
58°	4.3"	4.0"	236°	5.0"	6.0"
62°	3.3"	4.0"	242°	6.0"	3.0"
64°	3.3"	7.5"	244°	4.3"	5.0"
67°	4.5"	4.5"	248°	4.7"	5.7"
70°	4.5"	5.5"	254°	4.7"	3.5"
74°	3.3"	5.5"	257°	3.8"	7.0"
80°	3.8"	4.0"	260°	3.4"	4.5"
84°	4.3"	3.5"	261°	3.4"	2.3"
86°	3.3"	5.0"	264°	3.5"	2.3"
90°	3.3"	8.0"	267°	3.4"	2.0"
94°	3.3"	5.3"	270°	3.5"	7.0"
100°	3.8"	7.0"	274°	3.3"	2.5"
104°	4.3"	4.3"	278°	3.4"	8.5"
106°	4.3"	4.5"	280°	3.2"	2.5"
108°	4.3"	4.5"	283°	3.0"	7.0"
110°	4.3"	5.5"	290°	3.1"	8.0"
112°	3.5"	6.5"	294°	3.4"	3.8"
114°	4.0"	4.5"	295°	3.6"	3.5"
118°	4.0"	7.0"	297°	5.2"	6.5"
126°	4.0"	8.0"	304°	5.3"	4.0"
132°	4.3"	3.5"	307°	4.8"	5.0"
134°	4.3"	3.5"	311°	3.3"	4.0"
148°	4.0"	4.5"	316°	4.4"	7.3"
150°	4.3"	8.0"	318°	4.5"	3.0"
154°	5.5"	5.5"	338°	3.3"	4.0"
164°	5.3"	6.0"	342°	5.5"	8.0"
170°	9.0"	2.5"	350°	3.3"	5.5"
178°	6.0"	4.8"	356°	3.3"	4.5"
180°	3.8"				

Table B-9
RSRM-1B Aft Dome Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 3 December 1988	Time: 1240 Hours
Inspector(s): Jim Passman		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	X	yes	____	no	1

Notes/Comments:

1. Teflon tape was intact and in place full circumference on the inner tang interface.
2. A nominal amount of flashing was present intermittently full circumference on the clevis leg tip.
3. Rust contamination present full circumference on outer tang and clevis metal surfaces.

Table B-10
RSRM-1B Aft Segment Stiffener to Stiffener Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 4 December 1988	Time: 0900 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	X	no	____

Notes/Comments:

1. Mild corrosion underneath the weatherseal, however, the weatherseal did not appear to have any voids which allowed water to leak.

Table B-11
RSRM-1B Aft Segment ET Attach to Stiffener Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 4 December 1988	Time: 0900 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	____	yes	X	no	____

Notes/Comments:

Table B-12
RSRM-1B Aft Center Segment Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 5 January 1989	Time: 1200 Hours
Inspector(s): Virginia Chandler		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	X	yes	____	no	____

Notes/Comments:

Table B-13
RSRM-1B Forward Center Segment Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 9 January 1989	Time: 0950 Hours
Inspector(s): Scott Manz		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	X	yes	____	no	____

Notes/Comments:

1. Normal intermittent insulation flashing on tip of inner clevis leg.

Table B-14
RSRM-1B Forward Dome Factory Joint Internal Insulation Evaluation

Motor No.: RSRM-1B	Date: 3 February 1989	Time: 1810 Hours
Inspector(s): Jim Passman		

					Comment Numbers
1. Gas paths?	____	yes	X	no	____
2. Soot?	____	yes	X	no	____
3. Heat Affected Material?					
A. Tang	____	yes	X	no	____
B. Clevis	____	yes	X	no	____
4. Foreign Material?	____	yes	X	no	____
5. Ply Separations?	____	yes	X	no	____
6. Unbonds?	____	yes	X	no	____
7. Teflon Tape Condition (Tang)	X	yes	____	no	1

Notes/Comments:

1. The Teflon tape was present intermittently full circumference.

2. Minimal amount of flashing within joint.

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
AFT SEGMENT							
106424-12	26	AFT		N/A	N/A	360	AFT DOME REGION
106424-11	25	AFT		FIELD	CLEVIS	240-0	CLEVIS INSULATION
106424-10	24	AFT		FIELD	CLEVIS	120-240	CLEVIS INSULATION
106424-09	23	AFT		FIELD	CLEVIS	0-120	CLEVIS INSULATION
107668-01	00	AFT		FACTORY # 5	BOTH	90-180	CLEVIS AND TANG INSULATION
107668-07	00	AFT		FACTORY # 5	BOTH	270-0	CLEVIS AND TANG INSULATION
107668-08	00	AFT		FACTORY # 5	BOTH	180-270	CLEVIS AND TANG INSULATION
107680-13	00	AFT		FACTORY # 5	CLEVIS	189	SMALL VOID IN CLEVIS SIDE EXTERNAL WEATHERSEAL
107668-02	00	AFT		FACTORY # 6	BOTH	270-0	CLEVIS AND TANG INSULATION
107668-03	00	AFT		FACTORY # 6	BOTH	180-270	CLEVIS AND TANG INSULATION
107668-04	00	AFT		FACTORY # 6	BOTH	90-180	CLEVIS AND TANG INSULATION
107668-05	00	AFT		FACTORY # 6	BOTH	0-90	CLEVIS AND TANG INSULATION
107668-10	00	AFT		FACTORY # 7	BOTH	0-90	CLEVIS AND TANG INSULATION
107668-11	00	AFT		FACTORY # 7	BOTH	90-180	CLEVIS AND TANG INSULATION
107668-12	00	AFT		FACTORY # 7	BOTH	180-270	CLEVIS AND TANG INSULATION
AFT CTR SEGMENT							
106424-08	21	AFT CTR		FIELD	TANG	240-0	TANG INSULATION
106424-07	20	AFT CTR		FIELD	TANG	120-240	TANG INSULATION
106424-06	19	AFT CTR		FIELD	TANG	0-120	TANG INSULATION
106424-05	18	AFT CTR		FIELD	TANG	360	TANG INSULATION
106425-04	17	AFT CTR		FIELD	CLEVIS	240-0	CLEVIS INSULATION
106425-03	16	AFT CTR		FIELD	CLEVIS	120-240	CLEVIS INSULATION
106425-02	15	AFT CTR		FIELD	CLEVIS	0-120	CLEVIS INSULATION
106425-01	14	AFT CTR		FIELD	CLEVIS	360	CLEVIS INSULATION
108094-03	00	AFT CTR		FACTORY # 4		120-240	TANG AND CLEVIS INSULATION
108094-11	00	AFT CTR		FACTORY # 4		0-120	TANG AND CLEVIS INSULATION
108094-12	00	AFT CTR		FACTORY # 4		240-0	TANG AND CLEVIS INSULATION
108094-02	00	AFT CTR		FACTORY # 4	CLEVIS	76	RUST ON CLEVIS
108094-07	00	AFT CTR		FACTORY # 4	CLEVIS	138	RUST ON CLEVIS
108094-08	00	AFT CTR		FACTORY # 4	CLEVIS	114	RUST ON CLEVIS
108094-09	00	AFT CTR		FACTORY # 4	CLEVIS	0	RUST IN BOTTOM OF CLEVIS
108094-10	00	AFT CTR		FACTORY # 4	CLEVIS	0	TYPICAL CLEVIS
108094-01	00	AFT CTR		FACTORY # 4	TANG	123	RUST ON TANG
108094-04	00	AFT CTR		FACTORY # 4	TANG	157	RUST ON TANG
108094-05	00	AFT CTR		FACTORY # 4	TANG	102	RUST ON TANG

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
108094-06	00	AFT CTR		FACTORY # 4	TANG	0	TYPICAL TANG
FWD SEGMENT							
108722-01	00	FWD		FACTORY # 1	FWD DOME		CLEVIS AND TANG INSULATION
108722-02	00	FWD		FACTORY # 1	FWD DOME		CLEVIS AND TANG INSULATION
108722-03	00	FWD		FACTORY # 1	FWD DOME		CLEVIS AND TANG INSULATION
108760-01	00	FWD		FACTORY # 2			CLEVIS AND TANG INSULATION
108760-02	00	FWD		FACTORY # 2			CLEVIS AND TANG INSULATION
108760-03	00	FWD		FACTORY # 2			CLEVIS AND TANG INSULATION
106399-01	00	FWD		IGNITER-CASE	FWD DOME		IGNITER REMOVAL DOME SEAL SURFACE
106399-02	00	FWD		IGNITER-CASE	FWD DOME		IGNITER REMOVAL DOME SEAL SURFACE CLOSE-UP
106399-03	00	FWD		IGNITER-CASE	FWD DOME	360	FORWARD DOME AFTER IGNITER DISASSEMBLY
106399-04	00	FWD		IGNITER-CASE	FWD DOME	360	IGNITER INTERMITTENT CORROSION FORWARD DOME 360 DEGREES
106399-05	00	FWD		IGNITER-CASE	FWD DOME	360	IGNITER INTERMITTENT CORROSION FORWARD DOME 360 DEGREES
106399-06	00	FWD		IGNITER-CASE	FWD DOME	359	IGNITER INTERMITTENT CORROSION FORWARD DOME 359 DEGREES (CLOSE-UP)
106399-07	00	FWD		IGNITER-CASE	FWD DOME	359	IGNITER INTERMITTENT CORROSION FORWARD DOME 359 DEGREES (CLOSE-UP)
FWD CTR SEGMENT							
106425-08	13	FWD CTR		FIELD	TANG	240-0	FLAP, CYLINDER, AND TANG INSULATION
106425-07	12	FWD CTR		FIELD	TANG	120-240	FLAP, CYLINDER, AND TANG INSULATION
106425-06	11	FWD CTR		FIELD	TANG	0-120	FLAP, CYLINDER, AND TANG INSULATION
106425-05	10	FWD CTR		FIELD	TANG	360	FLAP, CYLINDER, AND TANG INSULATION
108193-01	00	FWD CTR		FACTORY # 3			TANG AND CLEVIS INSULATION
108193-02	00	FWD CTR		FACTORY # 3			TANG AND CLEVIS INSULATION
108193-03	00	FWD CTR		FACTORY # 3			TANG AND CLEVIS INSULATION
FXD HOUSING SEGMENT							
106478-03	00	FXD HOUSING				0	NOZZLE OVERALLS SIDE VIEW 0 DEG
106478-04	00	FXD HOUSING				90	NOZZLE OVERALLS SIDE VIEW 90 DEG
106478-05	00	FXD HOUSING				180	NOZZLE OVERALLS SIDE VIEW 180 DEG
106478-06	00	FXD HOUSING				270	NOZZLE OVERALLS SIDE VIEW 270 DEG
IGNITER SEGMENT							
106398-05	00	IGNITER		IGNITER-CASE	N/A	320	IGNITER REMOVAL PUTTY BLOW HOLE
106398-06	00	IGNITER		IGNITER-CASE	N/A	266-252	IGNITER REMOVAL GASK-O-SEAL 266 DEGREES SOOT TO PRIMARY 252 DEGREES

NEG NUMBER	PHOTO CODE	SEGMENT	STAGE OF PROCESS	JOINT	SEGMENT END	DEG LOC	COMMENT
106398-07	00	IGNITER		IGNITER-CASE	N/A	160	IGNITER REMOVAL INTERMITTENT CORROSION IGNITER ADAPTER 160 DEGREES
106398-08	00	IGNITER		IGNITER-CASE	N/A	320	IGNITER REMOVAL PUTTY BLOW HOLE 320 DEGREES (CLOSE-UP)
106398-09	00	IGNITER		IGNITER-CASE	N/A	320	IGNITER REMOVAL PUTTY BLOW HOLE 320 DEGREES
106398-10	00	IGNITER		IGNITER-CASE	N/A	320	IGNITER REMOVAL PUTTY BLOW HOLE 320 DEGREES
106399-08	00	IGNITER		IGNITER-CASE	N/A		IGNITER ADAPTER PLATE FORWARD SIDE OVERALL
106399-09	00	IGNITER		IGNITER-CASE	N/A		IGNITER ADAPTER PLATE AFT SIDE OVERALL

END OF REPORT

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